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Musculoskeletal Pain and Return to Work

A Cognitive-Behavioral Perspective

BY

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ABSTRACT

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Musculoskeltal pain is the most common diagnosis for being on sick leave two months or longer in Sweden. The societal costs have been estimated at almost 30 billion Swedish kronor per year. Research aimed at improving occupational rehabilitation is therefore crucial.

In Study I a multidisciplinary cognitive-behavioral in-patient program conducted at a rehabilitation clinic was empirically evaluated. A randomized controlled trial with 36 chronic pain patients showed a difference in favor of the treated patients compared to their controls on measures of occupational training and activity level at a 1-month follow-up. A consecutive trial with 85 chronic patients showed a decrease in sick leave, pain intensity, depression, and use of analgesics, and an increase in life control and physical fitness from pre-treatment to a 2-month and a 1-year follow-up. Study II was a randomized controlled evaluation of a return-to-work focused cognitive-behavioral out-patient program with a 6-month follow-up conducted by a psychologist. Effects were compared over 36 pain patients on short-term sick leave (2-6 months) and 36 patients on long-term sick leave (>12 months). The treated patients on short-tem sick leave reduced their sick leave and returned to work more than their controls. They also improved their abilities to control and decrease the pain more. However, the patients on long-term sick leave did not improve on any outcome variables compared to their controls. In Study III a questionnaire aimed at identifying obstacles to return to work was developed and evaluated. The questionnaire was administrated to 154 chronic pain patients and was found to predict sick leave nine months after assessment. Important obstacles were perceived prognosis of a work return, social support at work, physical workload and harmfulness of work, pain intensity, and depression.

In conclusion, this thesis shows that cognitive-behavioral treatment focused on return to work is effective in helping chronic musculoskeletal pain patients back to work. A questionnaire developed to identify obstacles to return to work was shown to predict sick leave.

Key words: Back pain, cognitive-behavioral, multidisciplinary, musculoskeletal, neck pain, prediction, prevention, rehabilitation, return to work, shoulder pain, sick leave, treatment.

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“Pain is not just a sensation but, like hunger and thirst, is an awareness of an action plan to be rid of it.”

Patrick D. Wall

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

I. Johansson, C., Dahl, J., Jannert, M., Melin, L., & Andersson, G. (1998). Effects of a cognitive-behavioral pain-management program. *Behaviour Research and Therapy, 36,* 915-930.

II. Marhold, C., Linton, S. J., & Melin, L. (2001). A cognitive-behavioral return-to-work program: Effects on pain patients with a history of long-term versus short-term sick leave. *Pain, 91*, 155-163.

III. Marhold, C., Linton, S. J., & Melin, L. (in press). Identification of obstacles for chronic pain patients to return to work: Evaluation of a questionnaire. *Journal of Occupational Rehabilitation.*

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ABBREVIATIONS USED IN TEXT

AC	**Adaptive coper patient group**
ANCOVA	**Analysis of covariance**
ANOVA	**Analysis of variance**
BDI	**Beck Depression Index**
CBT	**Cognitive-behavioral therapy**
CSQ	**Coping Strategies Questionnaire**
DRI	**Disability Rating Index**
DYS	**Dysfunctional patient group**
FU	**Follow-up**
IASP	**International Association for the Study of Pain**
ICD-10	**International Classification of Diseases and Related Health Problems, 10^{th} ed.**
ID	**Interpersonally distressed patient group**
MANCOVA	**Multivariate analysis of covariance**
MPI	**Multidimensional Pain Inventory**
ORQ	**Obstacles to Return-to-work Questionnaire**
PAIRS	**Pain and Impairment Rating Scale**
POST	**Post-treatment**
PRE	**Pre-treatment**
VAS	**Visual Analogue Scale**

INTRODUCTION

About this thesis

Musculoskeletal pain is one of the most common reasons why people seek medical consultation in industrialized countries (Crombie, Croft, Linton, LeResche, & Von Korff, 1999). In Sweden, the societal costs due to neck and back pain have been estimated to be almost 30 billion Swedish kronor per year (Norlund & Waddell, 2000). It is found that compensation for sick leave accounts for about 90% of the societal costs, and treatment for only about 10% (Linton, 1998). Hence, research aimed at improving treatment and prevention of musculoskeletal pain is crucial.

The present thesis is about cognitive-behavioral therapy (CBT) for chronic musculoskeletal pain, and it is based on three empirical studies. Two studies are evaluations of CBT treatments focused on return to work, and in one study, a questionnaire for identification of obstacles to return to work is developed. The outline of the empirical studies is preceded by an introductory section, which describes definitions and categorizations of pain, its etiology and impact on the individual and on the society, and finally its susceptibility to different treatments.

Definitions and categorizations of pain

According to the International Association for the Study of Pain (IASP), pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (Merskey & Bogduk, 1994). This definition avoids tying pain to the stimulus. Many people report pain in the absence of tissue damage or any likely pathophysiological cause. There is usually no way to distinguish their experience from that due to tissue damage by way of subjective report. If they regard their experience as pain and if they report it in the same ways as pain caused by tissue damage, it should be accepted as pain (Merskey & Bogduk, 1994).

Pain can be categorized into five different subtypes according to Turk and Melzack (1992). Pain associated with tissue damage, inflammation, or a disease process that is of relatively brief duration (i.e., hours, days, weeks) regardless of intensity is referred to as *acute pain* (e.g., post-surgical pain). In the case of *acute recurrent pain,* individuals may suffer from episodes of acute pain interspersed with pain-free periods (e.g., migraine headaches). Pain that persists for extended periods of time (i.e., months or years), that accompanies a disease process (e.g., rheumatoid arthritis), or that is associated with an injury that has not been resolved within an expected period of time (e.g., low back pain) is referred to as *chronic pain*. *Chronic progressive pain* is a pain associated with a progressive disease and often worsens over time (e.g., cancer). *Laboratory-induced pain* is a pain induced by nociceptive stimulation in a laboratory setting (e.g., electric shock). Another distinction between acute and chronic pain refers to the duration of pain, for example, the pain is called acute the first three weeks, subacute between 4-12 weeks and chronic when the duration is longer than 12 weeks (Nachemson & Jonsson, 2000; Waddell, Feder, & Lewis, 1997).

Another way to categorize pain is based on the diagnosis. For example, pain associated with headaches or orofacial pain has been contrasted with pain associated with musculoskeletal disorders like low back pain and neck- and shoulder pain (Turk & Melzack, 1992). In the medical diagnosis system, ICD-10, conditions are classified according to signs and symptoms of physical pathology (World Health Organization, 1992). A diagnosis may identify a cause of symptoms and recommend treatment. Yet within a specific diagnosis, patients differ considerably in how they are affected. Physicians and clinical investigators have long recognized that disease categories provide minimal information about the impact of illness upon patient experiences (Turk & Melzack, 1992). Therefore, assessment of other aspects of the pain experience is important. This includes assessment of patients' mood, attitudes, beliefs, coping efforts, resources, and the impact of pain on their lives. No one system for categorizing pain or pain patients has been universally accepted by clinicians or researchers (Turk & Melzack, 1992).

Using cluster analysis, Turk and Rudy (1988) and Rudy, Turk, Zaki and Curtin (1989) have empirically developed a classification system with three subgroups of pain patients labeled the dysfunctional patients (DYS), the interpersonally distressed (ID), and the adaptive copers (AC). The DYS patients were characterized by high pain intensity, marked interference with everyday life due to pain, high affective distress, low perception of life control, and low activity level. The AC patients reported lower pain severity, lower interference and affective distress, a higher activity level, and higher life control than the other two groups. The ID group was mainly distinguished by lower reported levels of social support, lower scores on solicitous and distracting responses from significant others, and higher scores on punishing responses compared to the DYS and AC patients. Burns, Kubilus, Bruehl and Harden (2001) have empirically derived a fourth cluster called the repressors, which is a group emerging from the DYS with high pain intensity, low activity level, and low affective distress.

Etiology: Some models and factors related to the origins of pain

The biomedical model

The biomedical model of pain assumes that an individual's complaints should result from a specific disease state represented by disordered biology. This mechanistic model dates back to the ancient Greeks and was codified by Descartes in the 17th century (Turk, 1996). According to the specificity theory there exist specific pain sensory receptors responsible for the direct transmission of pain sensations to the brain, and the intensity of the pain experience is proportional to the size of the tissue damage. The biomedical model has been dominating the view on pain into the 20th century and has led to medical interventions specifically directed toward correcting the organic dysfunction or pathology. It is assumed that once the disease is "cured" secondary reactions like pain and depression will disappear. If they do not, psychological causation is assumed. Thus, traditional medicine has adopted a dichotomous view in which symptoms are either somatogenic or psychogenic, that is, there exists somatogenic pain caused by physical factors and psychogenic pain caused by psychological factors. However, this dichotomous view cannot explain why people with identical pathology can experience different pain intensity or why there can exist pathology without pain (Turk & Flor, 1999). There is also a substantial number of people suffering from persistent pain that is refractory to available medical and surgical treatments, and functional disability often appears to be in excess of what might be expected on the basis of physical pathology alone (Turk, 1996).

The gate control theory

The first attempt to develop an integrative model designed to address the problems created by unidimensional models and to integrate physiological and psychological factors was the gate control theory proposed by Melzack and Wall (1965). The theory suggests that a neural mechanism in the spinal cord acts like a "gate" that can facilitate or inhibit the flow of nerve impulses from the body (peripheral nerves) to the brain (central nervous system). When the amount of information that passes through the gate exceeds a critical level, the neural areas responsible for pain experience and response are activated. Somatic input is subjected to the modulating influences of cognitive, affective, and behavioral factors before it evokes pain perception. Psychological factors may mediate pain by altering individuals' appraisals of the threat, their ability to control the quality of the noxious sensations, and their emotional arousal. The gate control theory therefore states that the experience of pain is constituted of an interaction of motivational-affective, cognitive-evaluative and sensory-physiological processes (Melzack & Casey, 1968).

This model contradicts the notion that pain is either somatic or psychogenic and instead postulates that both factors have either potentiating or moderating effects on pain perception. Thus, the gate control theory specifically includes psychological factors as an integral part of the pain experience. By emphasizing central nervous system mechanisms it also provides a physiological basis for the role of psychological factors in chronic pain, and has been described as a hallmark in the development of psychological interventions for pain (Turk & Flor, 1999). Although the physiological details of the gate control theory have been challenged, the theory has proved remarkably resilient and flexible in the face of accumulating scientific data (Melzack & Wall, 1982). From a sociological perspective the gate control theory has been challenged since it makes the patient “responsible” for his/her problem (Kugelmann, 1997).

The biopsychosocial model

In contrast to the biomedical model’s emphasis on disease, the biopsychosocial model focuses on pain as an illness. The distinction between “disease” and “illness” is crucial to understanding chronic pain (Turk, 1996). Disease is generally defined as an “objective biological event” in contrast to illness, which is a complex interaction of biological, psychological, and social variables. Illness can be described in terms of how the sick individual and his/her social network receive, live with, and respond to the symptoms and disability. It has been commonly observed clinically and in empirical studies that pain report, disability, and related psychological distress are only loosely related to observable pathophysiology (Magora & Schwartz, 1980, Waddell & Main, 1984). The diversity in illness expression is accounted for by interrelationships among biological changes, psychological status, and the social and cultural contexts that shape the patient’s perceptions of and response to illness. In the course of the development of chronic pain the weighing of these physical, psychological, and social factors may change. For example, during the acute phase of the syndrome biological factors may dominate, but over time psychological and social factors may become the more dominant.

Learning theory (behavioral factors)

A new era in thinking about pain began with Fordyce’s (1976) description of the role of operant factors in chronic pain. In the operant formulation, central stage is given to behavioral manifestations of pain, rather than pain *per se*. According to Fordyce pain is constituted of its behaviors, like avoidance of activities, verbal complaints, and help seeking. These behaviors are observable and they are consequently subject to the principles of learning. The immediate behavioral response to acute pain is withdrawal or an attempt to escape the noxious stimuli. In chronic pain this develops into avoidance of activities, which is a behavior that is negatively reinforced, that is, by avoiding the activity the unpleasant pain experience is avoided. Pain behaviors (e.g., complaining, inactivity) may be positively reinforced, for example by attention from a spouse and/or health care providers. Pain behaviors may also be maintained by the escape from noxious stimulation by the use of medication or rest, or the avoidance of undesirable activities like work. In addition, “well behaviors” (e.g., activity, working) may not be sufficiently reinforcing, and the more rewarding pain behaviors may therefore be maintained. The operant conditioning model does not concern itself with the initial cause of pain. Rather, it considers pain as an internal subjective experience that may be maintained even after an initial physical basis for it is resolved (Turk, 1996). Several studies have provided evidence that supports the underlying assumptions of the operant conditioning model (Block, Kremer, & Gaylor, 1980; Cairns & Pasino, 1977; Doleys, Crocker, & Patton, 1982). The operant view has also generated what has proven to be an effective treatment for selected samples of chronic pain patients (Keefe, Dunsmore, & Burnett, 1992; Keefe & Williams, 1989). Treatment focuses on extinction of pain behaviors and positive reinforcement of well behaviors. The operant conditioning model has been criticized for not including emotional and cognitive aspects of pain (Schmidt, Gierlings, & Peters, 1989; Turk & Flor, 1987), and for its failure to treat the subjective experience of pain (Kotarba, 1983).

Chronic pain may also be initiated and maintained by respondent conditioning (Gentry & Bernal, 1977). Avoidance of activities has been shown to be related more to anxiety about pain than to actual reinforcement (Linton, 1985). Linton, Melin and Götestam (1984) have suggested that once an acute pain problem exists, fear of motor activities that the patient expects to result in pain may develop and motivate avoidance of activity. Nonoccurrence of pain and anxiety is a powerful negative reinforcer for reduction of activity. Thus, the original respondent conditioning may be followed by an operant learning process whereby the nociceptive stimuli and the associated responses need no longer be present for the avoidance behavior to occur. In acute pain states it may be useful to reduce movement, and consequently to avoid pain, in order to accelerate the healing process. However, over time anticipatory anxiety related to activity may develop and act as a conditioned stimulus for sympathetic activation (the conditioned response). The anxiety may be maintained after the original unconditioned stimulus (injury) and unconditioned response (pain and sympathetic activation) have subsided (Lenthem, Slade, Troup, & Bentley, 1983; Linton et al., 1984; Philips, 1987). Over time, fear of pain may become conditioned through stimulus generalization to an expanding number of situations like simple motor behaviors, work, leisure activities, and sexual activity (Philips, 1987). Subsequently, patients may display maladaptive responses to many stimuli and reduce the frequency of their performance of many activities other than those that initially induced pain.

Pain behaviors may also be acquired through observational learning and modeling processes (Turk & Flor, 1999). That is, individuals can learn responses that were not previously in their behavioral repertoire observing others who respond in these ways (Bandura, 1969).

Cognitive and affective factors

The specific thoughts and feelings that pain patients experience prior to exacerbation of pain, during an exacerbation or intense episode of pain, and following a pain episode, can greatly influence physiological arousal, the experience of pain, and subsequent pain episodes (Newton & Barbaree, 1987). The cognitive factors can be divided into beliefs about pain, beliefs about controllability, self-efficacy, cognitive errors, and coping (Turk, 1996). The affective factors can be divided into feelings of depression, anxiety, and stress (Melzack, 1999; Turk, 1996).

The beliefs that the patients have about their pain can lead to impaired psychological functioning, decreased coping efforts, pain behaviors, exacerbation of pain, and greater disability (Jensen, Romano, Turner, Good & Wald, 1999; Strong, Ashton, & Chant, 1992; Williams, Robinson, & Geisser, 1994). Examples of pain beliefs are that the pain is caused by ongoing tissue damage, that the pain will persist whatever you do, and that the pain is unexplainable or caused by something that has not yet been discovered. When patients have so called fear-avoidance beliefs they think that the pain is dangerous because it is a sign of (re)injury and that all movements and activities that lead to symptoms of pain have to be avoided (Vlaeyen, Kole-Snijders, Boeren, & van Eek, 1995). Fear-avoidance beliefs have been found to be related to new episodes of back pain in the future (Klenerman et al., 1995; Linton, Buer, Vlaeyen, & Hellsing, 1999).

Pain patients also tend to believe that they have limited ability to exert any control over their pain except avoiding activities or taking medication (Turk & Rudy, 1988). They often have negative expectations about their own ability to control certain motor skills without pain. Such negative, maladaptive appraisals about controllability can lead to higher pain intensity and disability (Flor & Turk, 1988; Jensen & Karoly, 1991). Closely related to the sense of control over an aversive stimulation is the concept of self-efficacy, which refers to an individual's belief in his/her capacity to engage in a behavior that can control the situation (Bandura, 1977). Pain patients with a low self-efficacy do not think that they can control their pain and studies have shown that this can lead to a lower pain tolerance and a higher grade of disability (Council, Ahern, Follick, & Kline, 1988; Litt, 1988).

In addition to specific self-efficacy beliefs there exists a set of common cognitive errors that can affect perceptions of pain, affective distress, and disability (Smith, Aberger, Follick, & Ahern, 1986; Smith, Peck, Milano, & Ward, 1990). A cognitive error may be defined as a negatively distorted belief about oneself or one's situation. A common cognitive error found among pain patients is catastrophizing (Lefebvre, 1981), which is a tendency to anticipate negative outcomes or aversive aspects of an experience or to misinterpret the outcome of an event as extremely negative. Catastrophizing has been shown to greatly influence pain and disability (Keefe et al., 1990a, 1990b). Other cognitive distortions found among pain patients are errors like personalization, overgeneralization, and selective abstraction (Lefebvre, 1981). Studies have also found that chronic pain patients show bias in their information processing by selectively processing sensory-intensity information (Pincus & Morley, 2001).

Th things people do to minimize their symptoms of pain are called their coping strategies. Studies have found that active coping strategies for pain, like engaging in activity or ignoring pain, are associated with adaptive functioning. Passive coping strategies, like avoiding activities or depending on others for pain control, have been found to be related to greater pain and depression (Brown, Nicassio, & Wallston, 1989; Lawson, Resor, Keefe, & Turner, 1990; Tota-Faucette, Gil, Williams, & Goli, 1993). The most important factor in poor coping appears to be catastrophizing (Heyneman, Fremouw, Gano, Kirkland, & Heiden, 1990; Martin, Nathan, Milech, & Van Keppel, 1989).

Research suggests that about 40% to 50% of chronic pain patients suffer from depression (Turk, 1996). Turk and Salovey (1984) concluded that in the majority of cases depression appears to be a reaction to the pain condition and not vice versa. Turk, Okifuju and Scharff (1994, 1995) have found that pain patients who think they can continue to function despite pain and who feel some control over the pain will not get depressed. However, Turk (1997) concludes in a review study that anxiety, fear, and depression at the time of acute pain are clearly related to the development of chronic pain. In a recent review study by Linton (2000a) the conclusion is that there is strong evidence that depression is linked to future back pain.

According to the neuromatrix theory of pain the stress regulation system is an integral part of the multiple contributions that give rise to chronic pain (Melzack, 1999). Anderberg (1999) concludes that it is likely that development of the fibromyalgia syndrome is due to numerous biological events occurring in response to long-term stress.

Personality factors

It has been discussed whether specific personality factors can predispose individuals to develop chronic pain (Turk, 1996). Attempts have been made in studies to identify a specific “migraine personality”, a “rheumatoid arthritis personality”, and a more “pain-prone personality” (Blumer & Heilbronn, 1982). These efforts have received weak empirical support and have been challenged (Linton, 2000a; Turk & Salovey, 1984). However, for example individual differences in anxiety sensitivity have been linked to the experience of pain (Asmundson, Norton, & Norton, 1999).

Work related factors

Epidemiological studies indicate that there are psychosocial and physical risk factors for developing pain at the workplace. Psychosocial risk factors include high time pressure, monotonous or boring work tasks, low job satisfaction, low social support, and uncertainty about how to perform one's work tasks (Bongers, de Winter, Kompier, & Hildebrandt, 1993; Ekberg et al., 1995; Holmström, Lindell, & Moritz, 1992; Hoogendoorn, Poppel, Bongers, Koes, & Bouter, 2000; Houtman, Bongers, Smulders, & Kompier, 1994; Linton, 1990). Physical risk factors include uncomfortable work postures such as highly repetitive arm movements, heavy work, vibrations, too much or to little sitting, and lack of work breaks (Hoogendoorn, Poppel, Bongers, Koes, & Bouter, 1999; Kilbom, 1994; Sommerich, McGlothlin, & Marras, 1993; Wallace & Buckle, 1987). In a recent review study including 21 studies Linton (2001) found that there is strong evidence that job satisfaction, monotonous work, work relations, job demands, stress, and perceived ability to work are related to future back pain. Moderate evidence is found for the role of control, work pace, the belief that work is dangerous, and emotional effort at work. However, the data concerning the role of work content in relation to future back pain was found to be inconclusive (Linton, 2001).

Epidemiology, socioeconomic costs, and individual impact

As mentioned, musculoskeletal pain is one of the most common reasons why people seek medical consultation in industrialized countries (Crombie et al., 1999). Epidemiological studies have found the lifetime prevalence of back pain to be 85%, which indicates that as many as 85% of adults will miss work or seek professional care for spinal problems during their working career (Fordyce, 1995; Nachemson, 1992; Waddell, 1996). The life-time prevalence of neck pain is shown to be about 70% (Croft, Joseph, & Cosgrove, 1994; Mäkele et al., 1991). A recent Swedish epidemiological study by Linton, Hellsing and Halldén (1998) found the 1-year prevalence of musculoskeletal pain to be 66% in an age group consisting of 35- to 45-year-olds. Not all of these persons reporting pain had serious problems, but 25% were deemed to have a significant problem that included intense pain episodes and considerable functional hindrance. In an earlier Swedish study, Brattberg, Thorslund and Wikman (1989) found that about 40% of the adult population reported considerable pain lasting more than 6 months, although many did not seek help for it.

Musculoskeletal pain causes enormous economic expenditures for society (Linton, 1998; Nachemson, 1992). In Sweden as mentioned, the societal costs due to neck and back pain have been estimated to be almost 30 billion Swedish kronor per year (Norlund & Waddell, 2000). In comparison with other European countries like the Netherlands and Great Britain the societal costs for pain per citizen per year was found to be about the same. However, Sweden has about three times more sick leave days for pain per 1000 citizens in the age group 16-64 years compared to the other countries (Norlund & Waddell, 2000). It is found that compensation for sick leave accounts for about 90% of the societal costs, and treatment for only about 10% (van Tulder, Koes, & Bouter, 1995; Linton, 1998). Linton et al. (1998) found in their epidemiological study that 19% of those with pain had been on sick leave for it the previous year, and 15% had missed worked because of pain but had arranged the absence without being formally on sick leave.

Approximately 37% of Swedes sick-listed two months or longer the year of 2000 were diagnosed as having musculoskeletal pain, which was the most common diagnosis (Lidwall, 2001). The proportion of given disability pensions due to back pain was 22% in Sweden in 1995 (Norlund & Waddell, 2000). A third of the reported work-related injuries in Sweden 1998 was due to musculoskeletal pain (National Board of Occupational Safety, 1999). In an American study back pain was found to be the most common reason for work inability for persons up to 45 years, and the fourth most common reason for those in the age group 45-64 years (Andersson, 1997).

It is well known that about 85% of people suffering from acute back pain will return to work within 6 weeks (Reid, Haugh, Hazard, & Tripathi, 1997). This does not mean that all these people have recovered, since research shows that over 40% still report considerable pain and dysfunction a year after the acute pain episode (Von Korff, 1994). However, only a minority will develop chronic pain and studies indicate that less than 10% of the pain patients consume as much as 70-80% of the resources, including sick leave benefits and health care visits (Linton, 1994a; Reid et al., 1997; Skovron, 1992). When it comes to health care visits it is found that most of the costs are spent on diagnostics and surgery and only a small amount is spent on multidisciplinary interventions (Linton 1998; van Tulder et al., 1995).

It is well documented that musculoskeletal pain is associated with emotional distress for many individuals (Linton, 2000a; Walker, Holloway, & Soafer, 1999). Wändell, Brorsson, and Åberg (1997) compared patients with diabetes, hypertension, and musculoskeletal pain with healthy controls and found that all patient groups suffered considerable distress, for example feeling tired and worried, as compared to the healthy controls. They also found that the patient groups had a significantly lower income than the healthy controls. Being on sick leave can in some ways be compared to being unemployed. Many studies show that unemployment leads to depression and anxiety (Claussen, 1999; Comino, Harris, Silove, Manicavasagar, & Harris, 2000; Montgomery, Cook, Bartley, & Wadsworth, 1999; Varela-Novo, 1999). Harrison, Barrow, Gask, and Creed (1999) investigated social determinants for psychological morbidity and found that the factors that best predicted this were absence of a confidante, a longstanding physical illness, and being unemployed.

Treatment

Recommendations for return to work

The IASP's Task force on pain in the work place recommends that nonspecific low back pain should be considered a problem of activity intolerance instead of being seen as a medical problem (Fordyce, 1995). This underscores the importance of trying to restore the functions of the individual in accordance with the biopsychosocial model, instead of trying to eliminate the pain as in traditional medicine. The IASP emphasizes work site-based interventions as a method for minimizing and limiting disability (Fordyce, 1995). Feuerstein and Zastowny (1996) and Waddell (1998) also underscore the importance of including return to work as a main component in the treatment of musculoskeletal pain.

Medical interventions

Physicians' treatment of chronic and acute/subacute pain patients in primary care consists of prescribing medication, giving recommendations about exercise or bed rest, making referrals to X-ray and/or physiotherapy, or making no intervention at all (Turner, Le-Resche, Von Korff, & Ehrlich, 1998; van Tulder, Koes, Bouter, & Metsemakers, 1997). In a Swedish study, primary care physicians had to "treat" standardized simulated cases with low back pain on their first visit (Peterson, Eriksson, & Tibblin, 1997). The most common interventions suggested were sick-listing on full time (97% of the physicians), scheduling of another visit (96% of the physicians), prescribing medication (90% of the physicians), and referral to physiotherapy (77% of the physicians). In another Swedish study, Englund and Svärdsudd (2000) found that patients appear to have a strong influence on sick-listing practice among primary care physicians.

According to a review study by van Tulder, Goossens, Waddell, and Nachemson (2000) pharmacological interventions have very limited efficiency for chronic low back pain patients. Analgesics have only been proven effective when prescribed as pain relief to facilitate a graded increase of activities. When analgesics are prescribed the first choice should be paracetamol, and if that does not work antiflogistica (so called NSAIDS:s) could be tried during a limited period of time. For chronic neck pain no studies have shown empirical support or efficiency of pharmacological interventions (Goossens, van Tulder, & Hoving, 2000). However, analgesics can be effective for acute back and neck pain when taken on schedule-limited periods of time (Harms-Ringdahl & Nachemson, 2000; van Tulder & Waddell, 2000).

A review study of Waddell et al. (1997) concludes that recommendations for bed rest are not proven effective as an intervention for acute low back pain. There is, however, strong evidence for recommendations for staying active and continuing with daily activities being effective as an intervention. These results are also valid for acute neck pain patients (Harms-Ringdahl & Nachemson, 2000). There is no evidence that recommendations for bed rest or unspecific recommendations for exercise have a positive effect on chronic low back pain or neck pain (Goossens et al., 2000; van Tulder et al., 2000).

As for surgical interventions, a review study by Waddell, Alaslair Gibson, and Grant (2000) found that surgical interventions are only successful for carefully selected patients with low back pain with sciatica caused by an acute disk displacement. Surgical interventions for chronic low back pain caused by disk degeneration (Waddell et al., 2000) or surgical interventions for acute or chronic neck pain have not been proven effective (Carlsson & Nachemson, 2000).

Physiotherapeutic interventions

Traditional unspecific physiotherapy conducted by physiotherapists such as manipulations, heat, massage, stretching or different kinds of muscle training have not been shown more effective than placebo for either chronic back pain or neck pain (Goossens et al., 2000; van Tulder et al., 2000). Physical modalities like TENS, EMG-biofeedback, acupuncture, or corset have not either been proven effective for chronic back or neck pain.

In a review study by van Tulder and Waddell (2000) it was found that different specific back exercises are not effective for acute back pain. They found, however, that physiotherapeutic manipulations could be effective as pain relief the first six weeks for acute back pain. For acute neck pain the empirical support for manipulations is weaker (Harms-Ringdahl & Nachemson, 2000). Muscle training has been shown to be more effective for acute neck pain than more passive methods like massage, heat, and stretching (Harms-Ringdahl & Nachemson, 2000).

Ergonomic changes of the work environment have not been shown to lead to a reduction of musculoskeletal disorders (Frank et al., 1996). So called back schools, where ergonomic working postures are taught in combination with advice about exercise, have only shown weak empirical support for acute and chronic back pain (van Tulder et al., 2000; van Tulder & Waddell, 2000).

Psychological interventions

CBT has in review studies been shown to have considerable empirical support for sub-acute and chronic back- and neck pain, and is therefore the dominating psychological intervention for musculoskeletal pain (Linton, 2000b; Morley, Eccleston, & Williams, 1999). There exist no prospective and controlled studies of psychodynamic psychotherapy with chronic pain patients (Compas, Haaga, Keefe, Leitenberg & Williams, 1998; Grzesiak, Ury, & Dworkin, 1996; Linton, 2000b).

CBT interventions for pain belong to the behavioral medicine field, which studies how behaviors and life-styles contribute to health and disease (Turk, Meichenbaum, & Genest, 1983). The teaching of active coping strategies (e.g., applied relaxation) is one of the corner stones in CBT approaches to chronic pain (Turk et al., 1983). These coping strategies are to be applied by the patients in their “risk situations” for pain, based on individual behavior analyses. The treatment programs usually include components like education sessions, goal setting, graded activity training, applied relaxation, pacing, medication reduction, social skills training, and cognitive techniques (Philips & Rachman, 1996; Turk et al., 1983). The education sessions usually cover the gate control theory of pain (Melzack & Wall, 1965), and a model of risk factors and coping (Turk et al., 1983). By goal setting personal long- and short-term goals regarding work and leisure time are set. In graded activity training performance is increased gradually based on a quota system (Fordyce, 1976), or increased gradually by negotiating with the patient (Linton, 1994b). By pacing of activities the patients are taught a regular schedule of activities and breaks. Relaxation often consists of applied relaxation (Öst, 1987). This method starts with progressive relaxation, and then moves on to a brief cue-controlled relaxation technique, which is applied in situations that provoke stress or pain. Medication reduction is performed according to regular timed medication schedules. Cognitive techniques include distraction techniques (directing attention away from the pain or to the pain) and cognitive restructuring (reinterpretation of catastrophic or negative thoughts to more realistic thoughts and positive coping self-statements). Social skills training includes assertiveness training and how to handle conflicts (Fedoravicius & Klein, 1986). The more specific operant programs only include components like graded activity training and drug reduction in combination with contingency management of pain- and well behaviors (i.e., ignoring pain behaviors and paying positive attention to well behaviors) (Fordyce, 1976). Many CBT programs include planning of work return and occupational training (Linton, 2000b) in accordance with the recommendations of the IASP (Fordyce, 1995).

Most pain management programs are aimed at chronic pain, but there are also programs for acute and subacute pain. Some programs only include patients with a specific pain site, such as back pain, and other programs mix patients with different musculoskeletal pain sites. Other distinctions are that the programs can be multidisciplinary (conducted by several professions) or unidisciplinary (conducted by only one profession), and be given in an inpatient or outpatient format. The programs can also be given individually or to a group. Most CBT programs for pain patients are given in a group format.

There are several evaluations of CBT programs for chronic musculoskeletal pain. Williams et al. (1996) compared a cognitive-behavioral multidisciplinary in-patient program for mixed chronic patients with a similar out-patient program, and found that both programs led to significant improvements on psychological function and physical performance compared to the control group. However, the in-patients made significantly greater gains than the out-patients on most outcome measures and their gains were better maintained at a one year follow-up. Return to work could not be compared because a large part of the population studied consisted of retired persons, homemakers, and unemployed persons. Peters, Large and Elkind (1992) did not find any differences between in-patients and out-patients at about one year follow-up, except that superior improvement on return to work was found for the in-patients.

Vlaeyen, Haazen, Schuerman, Loe-Snijders, and van Eek (1995) compared an operant program with an operant-cognitive program and an operant-respondent program. They found that the operant-cognitive and operant-respondent conditions were more effective in decreasing pain behaviors and in increasing health behaviors and efficacy expectancies than the operant condition alone. Kole-Snijders et al. (1999) compared a cognitive-behavioral multidisciplinary program for chronic low back pain patients with an operant program with spouse training. Both programs led to significant improvements in psychological function and activity level compared to the control group. At post-treatment the CBT program led to better pain coping and pain control than the operant program. However, this difference was not significant at follow-ups. Jensen, Bergström, Ljungquist, Bodin, and Nygren (2001) compared a cognitive-behavioral multidisciplinary program for mixed chronic patients with its two unidisciplinary components, behavior-oriented physiotherapy and cognitive-behavior therapy. They found that the components yielded as good results as the whole program on measures of health-related quality of life. However, the treatments did not lead to a significant reduction of sick leave when compared to a “treatment-as-usual” control group. Turner, Clancy, McQuade, and Cardenas (1990) also compared a multidisciplinary program with its two components of behavioral therapy and physical therapy and found no significant differences on measures of pain and physical and psychosocial disability at 6- and 12-month follow-ups.

In a systematic review, which included six randomized controlled trials with high methodological quality, van Tulder et al. (2001) found that there is strong evidence that behavioral treatment has a moderate positive effect on pain intensity, and small positive effects on generic functional status and behavioral outcomes for patients with chronic low back pain when compared with waiting list controls or no treatment. There was no strong evidence in favor of any type of behavioral treatment: cognitive, operant, or respondent treatment or combinations of these treatments. They also found moderate evidence that the addition of behavioral treatment to a usual treatment program (e.g., physiotherapy, back education, medical treatment) has no positive short-term effects on pain intensity, generic functional status, and behavioral outcomes. Morley et al. (1999) concluded in their systematic review and meta-analysis of 25 randomized controlled trials, which compared CBT treatments for chronic pain with waiting-list controls and alternative-treatment controls, that CBT treatments produced significantly greater changes in pain experience, cognitive coping and appraisal, and reduction of pain behaviors. Morely et al. (1999) and van Tulder et al. (2001) did not include return to work as a specific outcome measure. However, Flor, Fydrich, and Turk (1992) found in a meta-analysis consisting of 65 studies that chronic back pain patients treated at multidisciplinary pain centers were twice as likely to return to work than controls. Treated patients also improved significantly more on measures of pain intensity, mood, and interference. Cutler et al. (1994) found in a review that 41% of the patients not working at pre-treatment returned to work after treatment at non-surgical pain centers.

There exist some evaluations of cognitive-behavioral interventions for acute and subacute pain. Linton and Andersson (2000) compared a CBT program for patients with subacute and recurrent mixed pain with two groups receiving treatment-as-usual coupled with a written material about active coping. They found the risk of developing a long-term sick leave to be nine times lower for the CBT group as compared to the other groups.

However, all three groups tended to improve on variables of pain, fear-avoidance, and cognitions. Von Korff et al. (1998) found in another study that a lay-led CBT program for patients with acute back pain significantly reduced worry and disability at follow-up relative to a treatment-as-usual control. Linton and Ryberg (2001) investigated the effects of a CBT program in a group of non-patients with neck or back pain symptoms, and found that the treatment group had significantly better results with regard to fear-avoidance beliefs and number of pain free days as compared to a control group. The CBT intervention also reduced the risk for long-term sick leave during the follow-up three-fold.

In conclusion, there is strong evidence for the efficacy of CBT in improving coping strategies and reducing pain and disability-related behavior. There is also moderate evidence for the efficacy of CBT in decreasing sick leave and helping musculoskeletal pain patients return to work.

Aim of the thesis

The first aim was to evaluate the effects of a multidisciplinary cognitive-behavioral pain-management program to investigate if the results of international evaluations were possible to replicate in Sweden at an ordinary rehabilitation clinic. Of main interest was to evaluate the effects on sick leave and return to work. The second aim was to improve the CBT treatment by making it more focused on return to work during the program, and to see if and at what point during sick leave a unidisciplinary out-patient program led by a psychologist could be sufficient. The third aim was to develop and evaluate a questionnaire for identifying obstacles to return to work for pain patients. It was hypothesized that these obstacles would predict sick leave.

THE EMPIRICAL STUDIES

Study I

Introduction and aim

Cognitive-behavioral pain-management programs are often multidisciplinary and they are a combination of psychological and physiotherapeutic and/or occupational therapy interventions. Flor et al. (1992) concluded in a meta-analysis that chronic back pain patients treated at multidisciplinary centers showed better function and were twice as likely to return to work as controls (68% vs 36%). In another meta-analysis by Cutler et al. (1994), it was found that 41% of the patients not working at pre-treatment returned to work after treatment at non-surgical pain centers.

As many pain treatment evaluations are Anglo-American (Flor et al., 1992) there is still a need to evaluate different national programs to see if the results are possible to generalize. National evaluations are also important to have when trying to convince clinicians to implement new treatments. Since chronic pain is a major cause of work loss in economically developed countries (Linton, 1998; Nachemson, 1992) it is of special importance to examine the efficacy of pain treatment programs regarding return to work and/or reducing sick leave. In Sweden, all citizens are covered by a national health insurance and the compensation level when being on sick leave is generally 80% of the income. Many Anglo-American countries do not have this type of general health insurance.

Few outcome studies on cognitive-behavioral multidisciplinary programs have been conducted in Sweden so far. Linton, Bradley, Jensen, Spangfort, and Sundell (1989) evaluated a cognitive-behavioral multidisciplinary program for working women who had been sick-listed for back pain at some time during the previous 2-year period and found that the treatment could break a trend for increasing amounts of pain-related absenteeism. At 18-month follow-up all women were working and one third had no pain-related work absences during the follow-up (Linton & Bradley, 1992). Jensen, Nygren, and Lundin (1994) evaluated a cognitive-behavioral multidisciplinary program for chronic spinal pain and found that the program reduced sick leave compared to the control group. However, this result was not stable at 18-month follow-up of the program (Jensen & Bodin, 1998).

The aim of study I was to evaluate the effects of a multidisciplinary cognitive-behavioral pain-management program conducted at a department of rehabilitation medicine at a hospital. Of main interest was to evaluate the effects on sick leave and return to work to see if the results of international evaluations were possible to replicate in Sweden. The study consisted of two separate studies. The first study was a controlled outcome study with a 1-month follow-up. The second study was a consecutive study with a 2-month and a 1-year follow-up.

Method

All patients were consecutively recruited at a department of rehabilitation medicine at a hospital in a Swedish city (Sandviken). In the first study 42 patients were included and 36 completed the study. The total group of 36 patients (78% female) had a mean age of 43.5 years (*SD*=7.6). The average time since the onset of pain was 11 years (*SD*=6.3) and most of the patients (81%) had multiple pain sites. Of the total sample 75% were on sick leave and 32% were unemployed. Only 8% of the sample had higher education than two years at upper secondary school level, and 28% had only elementary school. The patients were randomly assigned between the two conditions; the treatment group (*n*=21) and the waiting list control group (*n*=21). The measurement occasions were pre-treatment, post-treatment, and follow-up one month after treatment. The outcome measures consisted of established self-report inventories like the Multidimensional Pain Inventory (MPI) (Kerns, Turk, & Rudy, 1985), the Coping Strategies Questionnaire (CSQ) (Jensen & Linton, 1993; Rosenstiel & Keefe, 1983), daily ratings of pain intensity and pain interference on Visual Analogue Scales (VAS) (Wewers & Lowe, 1990), self-report data on sick leave level in percent and hours of occupational training per day. In all, the attrition rate was 14% at outcome measurement. Multivariate effects of treatment were analyzed with MANCOVAs (the pre-treatment as covariate), and specific treatment effects were analyzed with univariate ANCOVAs (the pre-treatment as covariate). Between-group effect sizes (ES) were computed with Cohen's *d*.

The second study included 85 consecutive patients (68% female) with chronic musculoskeletal pain. The mean age was 42 years (*SD*=8.6). The average time since the onset of pain was 11 years (*SD*=9.0), and 49% of the patients had multiple pain sites. Most of the patients were born in Sweden (88%). Only 2% of the sample had an education of more than two years of upper secondary school, and 48% had only elementary school. Of the patients 71% were on sick leave, and the average length was 3.5 years (*SD*=4.4). Of the total sample 58% were employed, 39% were unemployed, 2% were studying, and 1% were supported by their spouses. The measurement occasions were pre-treatment, post-treatment, and a 2-month follow-up and a 1-year follow-up. The outcome measures consisted of established self-report inventories like the MPI (Kerns et al., 1985), the CSQ (Jensen & Linton, 1993; Rosenstiel & Keefe, 1983), the Beck Depression Index (BDI) (Beck, Ward, Mendelson, & Erbaugh, 1961), the Daily Rating Index (DRI) (Salén, Spangfort, Nygren, & Nordemar, 1994), a weekly rating of pain intensity on VAS (Wewers & Lowe, 1990), measures of physical fitness and use of analgesics, and self-report data on sick leave level in percent. The attrition rate at the 2-month follow-up varied over outcome measures between 0 to 7%. At the 1-year follow-up the variation was between 26% and 48%. The attrition rate for sick leave was lower, 0% at 2-month follow-up and 8% at 1-year follow-up. Treatment effects over time were analyzed with one-way repeated measures ANOVAs, and Tukey's post hoc tests were used to analyze differences between measurement occasions.

The multidisciplinary CBT program was given at the department of rehabilitation medicine at Sandviken hospital. The treatment team was staffed by a clinical psychologist/psychotherapist, who also had the role of team leader, a physiotherapist, an occupational therapist, a physical education teacher, a vocational counselor, a physician, and a nurse who served as administrator. All team members had received training in CBT techniques. The inpatient program was given over a period of four weeks, comprising five full days each week. Booster sessions were given after two months during two days, and occasionally help was provided on an individual basis if relapses occurred. Most of the program was conducted in a group format, and each group included ten patients. The program included education sessions, goal setting, graded activity training, exercise and individually tailored muscle training programs, pacing, applied relaxation, cognitive techniques, social skills training, drug reduction methods, and contingency management of pain behaviors. Planning of work return was conducted during the program, and a meeting with the employer, work leader, and insurance representative was organized for each patient. The intention was to get all patients back to work the first week after the program had ended. The first step back to work mostly consisted of occupational training, and this was also organized for the unemployed patients.

Results

Significant multivariate effects were found for the MPI (the activity scales) at post-treatment (Wilk's Lambda=0.527, $p<0.01$) and at 1-month follow-up (Wilk's Lambda =0.510, $p<0.01$), and for the CSQ at post-treatment (Wilk's Lambda=0.430, $p<0.05$). No MANCOVA was performed for sick leave and occupational activity. A significant between-groups difference in favor of the treatment was found for occupational training at the 1-month follow-up (ES=1.20), but no significant between-groups effects were found for sick leave (see Table 1). Significant between-groups differences in favor of the treatment were also found for the MPI-scales “Outdoor work” (ES=0.82), “Social activities” (ES=0.33), and “General activity level” (ES=0.71) at post-treatment and at 1-month follow-up, and for the CSQ-scales “Catastrophizing” (ES=0.45) and “Increase pain behaviors” (ES=0.94) at post-treatment. No significant multivariate effect or between-groups differences were found for the daily ratings of pain intensity and pain interference on VAS (see Table 1).

Table 1. Means (SD) of all measures for treatment and control groups at pre-treatment, post-treatment, and 1-month follow-up. ANCOVA F-values with pre-treatment used as covariate.

Measure	Group *M* (*SD*)	Pre *M* (*SD*)	Post *M* (*SD*)	FU	ANCOVA Post $F(1, 33)$	ANCOVA FU $F(1, 33)$
Occupational activity						
Level of sick leave (in %)	Treatment	84.3 (33.6)		80.4 (34.8)		0.55
	Control	51.7 (48.3)		59.6 (42.5)		
Occupational training # (in hours)	Treatment	1.2 (1.6)		2.8 (2.3)		11.24**
	Control	0.8 (1.4)		0.6 (1.2)		
VAS (0 - 100mm)						
Pain intensity	Treatment	52.8 (17.2)	49.3 (21.9)	54.2 (24.2)	0.19	0.07
	Control	53.3 (18.4)	52.2 (21.9)	53.2 (17.7)		
Pain interference	Treatment	50.8 (18.5)	42.3 (22.3)	47.6 (23.6)	3.21	0.42
	Control	46.9 (15.0)	48.2 (23.1)	48.2 (17.2)		
MPI (scores 0 - 6)						
Household chores	Treatment	4.0 (1.4)	4.2 (1.6)	4.1 (1.5)	2.14	2.65
	Control	3.6 (1.1)	3.5 (1.3)	3.4 (1.3)		
Outdoor work	Treatment	1.8 (1.2)	2.3 (1.3)	2.2 (1.4)	8.20**	12.43**
	Control	1.7 (1.2)	1.5 (1.2)	1.3 (0.7)		
Activities away from home	Treatment	2.0 (1.1)	2.0 (0.7)	1.9 (0.8)	0.17	1.87
	Control	2.3 (1.1)	2.1 (1.0)	1.8 (0.8)		
Social activities	Treatment	3.2 (1.0)	3.4 (1.2)	3.4 (1.1)	8.47**	12.62**
	Control	3.6 (1.0)	3.1 (1.0)	3.0 (1.3)		
General activity level	Treatment	2.8 (0.7)	3.0 (0.7)	2.9 (0.7)	8.79**	13.83***
	Control	2.8 (0.7)	2.6 (0.7)	2.4 (0.7)		
CSQ (scores 0 - 36)						
Diverting attention	Treatment	18.3 (8.5)	19.5 (12.3)	18.3 (10.6)	0.10	0.00
	Control	20.3 (6.8)	20.6 (7.4)	20.0 (6.6)		
Reinterpret pain sensations	Treatment	7.0 (8.7)	5.4 (9.5)	4.1 (6.9)	1.69	1.71
	Control	7.9 (7.7)	8.5 (8.7)	6.9 (7.7)		
Coping self-statement	Treatment	25.5 (8.0)	29.5 (9.9)	27.1 (8.8)	0.86	0.41
	Control	30.0 (9.4)	29.2 (8.7)	28.8 (9.8)		
Ignore pain sensations	Treatment	18.4 (9.2)	18.0 (9.7)	18.6 (8.9)	1.07	0.45
	Control	23.4 (9.3)	24.3 (10.4)	24.3 (12.1)		
Praying and hoping	Treatment	17.0 (10.0)	11.7 (9.0)	13.7 (9.8)	2.04	0.10
	Control	17.6 (9.5)	15.6 (10.3)	13.5 (8.9)		
Catastrophizing	Treatment	23.1 (12.7)	16.8 (10.7)	18.0 (11.6)	5.13*	1.07
	Control	23.8 (10.0)	22.1 (10.7)	21.2 (12.1)		

Increase activity level	Treatment	28.5 (9.8)	28.1 (9.5)	27.1 (9.8)	0.07	0.07
	Control	27.2 (9.0)	27.6 (9.4)	25.6 (9.3)		
Increase pain behaviors	Treatment	28.3 (8.7)	24.1 (7.7)	26.3 (9.2)	6.41*	0.69
	Control	32.5 (8.8)	31.9 (9..2)	28.5 (9.1)		

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, # $F(1, 24)$.

In the second study the average level of sick leave decreased significantly ($F(2,154)= 32.60$, $p<0.001$) over time from 63.8% at pre-treatment to 49.4% at 2-month follow-up, and to 29.8% at 1-year follow-up (see Figure 1). Tukey's post hoc test showed a significant decrease between pre-treatment and the 2-month follow-up, between pre-treatment and the 1-year follow-up, and between the 2-month and 1-year follow-up.

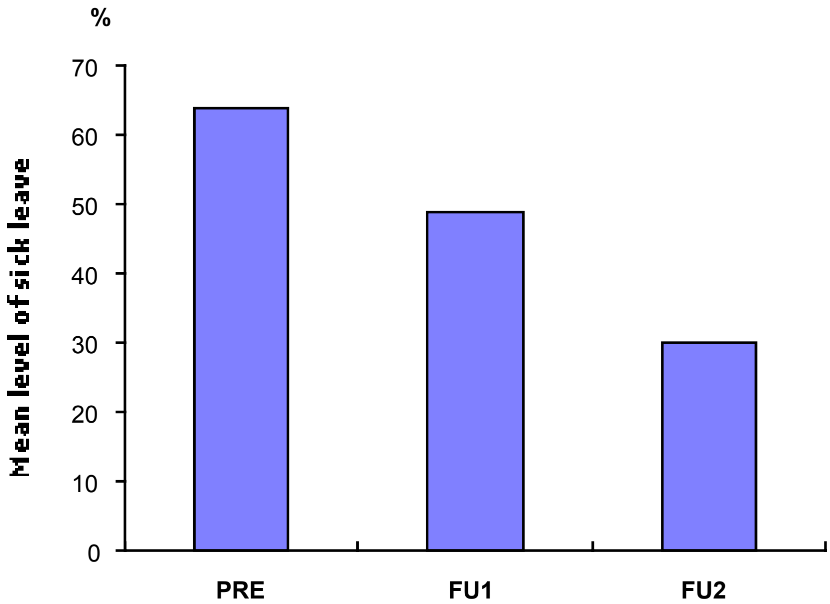

Figure 1. Mean level of sick leave in % at pre-treatment (PRE), at 2-month follow-up (FU1) and at 1-year follow-up (FU2).

In order to further explore the results for sick leave, the distribution of patients (in percent) over levels of sick leave was analyzed at pre-treatment, post-treatment, and 2-month and 1-year follow-ups (see Table 2). As can bee seen, the proportion of patients on full-time sick leave decreased considerably from pre-treatment to the follow-ups, as did the proportion of patients with no sick leave increase. Of the patients that were on full-time sick leave at pre-treatment, 49% had returned to work at 1-year follow-up.

Table 2. The distribution of patients in % over three levels of sick leave (*none*=no sick leave, *some*=part-time sick leave, i.e. 25%, 50% or 75% sick leave level, *full*=full-time sick leave) at pre-treatment (PRE), 2-month follow-up (FU1) and 1-year follow-up (FU2). Total percentages in bold at PRE, FU1, and FU2.

		FU1			FU2			
PRE		None	Some	Full	None	Some	Full	Drop-outs
None	**28.2**	24.7	3.5	0	25.8	0	1.2	1.2
Some	**11.8**	4.7	5.9	1.2	8.2	2.4	0	1.2
Full	**60.0**	4.7	17.6	37.7	17.6	21.2	15.3	5.9
		34.1	**27.0**	**38.9**	**51.6**	**23.6**	**16.5**	**8.3**

Significant effects over time were found on many of the other outcome measures (see Table 3). Tukey's post hoc test showed significant improvements from pre-treatment to both follow-ups on measures of pain intensity (VAS), pain severity and interference (MPI), life control and affective distress (MPI), depression (BDI), activities of daily living (DRI), catastrophizing and praying and hoping (CSQ), use of analgesics and physical fitness (see Table 3). The activity level in spare time (The MPI-scales "Activities away from home" and "Social activities") improved significantly only from pre-treatment to the 2-month follow-up.

Table 3. Means (SD) of all measures for the treatment group at pre-treatment, post-treatment, 2-month follow-up (FU1) and 1-year follow-up (FU2). ANOVA *F*-values are indicated.

Measure	Pre *M* (*SD*)	Post *M* (*SD*)	FU 1 *M* (*SD*)	FU 2 *M* (*SD*)	*df*	*F*-values
VAS (0 - 100 mm)						
Pain intensity	58.2 (24.4)	44.7[a] (23.7)	51.4 (27.1)	44.5[c] (26.4)	(3,132)	4.29**
MPI (scores 0 - 6)						
Pain severity	4.5 (8.5)		3.5[b] (1.4)	3.5[c] (1.4)	(2,100)	16.11***
Interference	3.9 (1.2)		2.8[b] (1.4)	2.9[c] (1.3)	(2,100)	29.58***
Life control	3.0 (1.3)		3.6[b] (1.1)	3.6[c] (1.2)	(2,98)	4.88**
Affective Distress	3.3 (1.1)		2.4[b] (1.6)	2.6[c] (1.5)	(2,100)	9.42***
Support	4.1 (1.4)		3.9 (1.2)	3.8 (1.3)	(2,98)	1.31
Punishing responses	1.6 (1.2)		1.2 (0.9)	1.4 (1.1)	(2,76)	2.31
Solicitous responses	2.8 (1.4)		2.4 (1.2)	2.4 (1.3)	(2,78)	3.38*
Distracting responses	2.3 (1.2)		2.3 (1.2)	2.1 (1.2)	(2,78)	0.47
Household chores	3.8 (1.2)		4.0 (1.3)	3.8 (1.3)	(2,100)	0.84
Outdoor work	1.9 (1.2)		1.9 (1.1)	2.0 (1.4)	(2,98)	0.61
Activities away from home	2.0 (0.9)		2.4[b] (0.9)	2.3 (1.0)	(2,100)	4.42*
Social activities	2.9 (1.1)		3.4[b] (1.0)	3.2 (1.2)	(2,100)	4.86**
General activity level	2.7 (0.7)		2.9 (0.6)	2.9 (0.7)	(2,100)	2.39
CSQ (scores 0 - 36)						
Diverting attention	16.2 (6.4)	18.6 (11.5)	14.7[d] (7.1)	14.3[e] (6.6)	(3,144)	5.73***
Reinterpret pain sensations	6.0 (6.3)	9.2[a] (8.4)	5.9[d] (5.9)	5.2[e] (6.5)	(3,144)	10.74***
Coping self-statements	20.0 (6.1)	21.2 (9.1)	17.3[d] (7.8)	18.5 (7.5)	(3,144)	4.25**
Ignore pain sensations	14.3 (5.9)	15.8 (7.3)	13.8 (7.2)	12.6[e] (6.3)	(3,144)	4.22**
Praying and hoping	12.7 (6.3)	8.3[a] (6.2)	8.1[b] (6.5)	7.6[c] (6.0)	(3,144)	18.03***

Catastrophizing	18.0 (8.0)	9.7[a] (8.1)	10.2[b] (7.9)	10.2[c] (7.7)	(3,147)	32.55***
Increase activity level	19.7 (6.0)	20.6 (5.7)	18.9 (6.9)	18.3[e] (5.5)	(3,147)	3.33*
Increase pain behaviors	20.5 (6.0)	17.2[a] (4.8)	17.6[b] (4.6)	18.1[c] (5.7)	(3,147)	9.29***
BDI (scores 0 - 63)						
Depression	12.9 (7.9)		8.3[b] (7.4)	10.1[c] (6.5)	(2,94)	13.20***
DRI (scores 120 - 0)						
Activities of daily living	48.9 (19.4)		40.9[b] (21.2)	39.8[c] (23.5)	(2,88)	5.92**
Physical fitness (ml 0^2/kg x min)						
Test bicycle	31.7 (8.3)		36.4[b] (8.6)	35.8[c] (8.2)	(2,84)	23.25***
Analgesics (categories 0 - 5)						
Use of analgesics	3.6 (1.5)		2.5[b] (1.6)	2.5[c] (1.5)	(2,106)	20.92***

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, a = significant difference between pre-treatment and post-treatment, b = significant difference between pre-treatment and follow-up 1, c = significant difference between pre-treatment and follow-up 2, d = significant difference between post-treatment and follow-up 1, e = significant difference between post-treatment and follow-up 2, all *P´s* < 0.05.

Conclusions

The results of the two outcome studies show that cognitive-behavioral multidisciplinary pain-management programs can successfully be applied to Swedish musculoskeletal pain patients. The treatment program significantly decreased sick leave over time and many patients did return to work. The program also improved psychological well being and physical fitness.

Study II

Introduction and aim

Many pain treatment programs are multidisciplinary and they have shown promising results in helping musculoskeletal pain patients back to work (Cutler et al., 1994; Flor et al., 1992). However, all patients do not return to work after cognitive-behavioral pain treatment programs (Sanders, 1996). Another disadvantage of multidisciplinary programs is that they often are comprehensive, which makes them very expensive. Obviously, this could be a limiting factor for the availability to the pain patient population as a whole. It is also doubtful whether such a comprehensive program is necessary for pain patients at an early stage in pain development.

Why do not all pain patients return to work after treatment? The point in time for the intervention may be crucial and, as reported by Linton (1999), the longer one post-pones interventions, the more comprehensive the treatment probably must be. Some studies also indicate that the chance of helping patients back to work seems to be better the shorter their sick leave time has been (Bendix, Bendix, & Haestrup, 1998; Hildebrandt, Pfingsten, Saur, & Jansen, 1997; Vendrig, 1999). However, no treatment outcome study has made a direct comparison of what time of intervention is most effective by comparing the same treatment program for patients on different lengths of sick leave. According to Linton (1995), another problem could be that in pain management programs the work-place has been regarded as something to return to after the program, rather than an integral part of the intervention. An improvement of pain management programs might be to include psychosocial and physical risk factors at work (found in epidemiological studies) in the treatment (Ekberg, 1995), and to encourage the patients to return to work during the program and practice the acquired coping strategies in those situations at the workplace.

The aim of study II was to improve the treatment results of study I by making the treatment more focused on return to work during the program, and to see if and at what point during sick leave a unidisciplinary out-patient program led by a psychologist could be sufficient for these patients. A cognitive-behavioral return-to-work focused pro-gram was therefore evaluated in a randomized controlled trial with a 6-months follow-up, and the effects were compared between a group of women on long-term sick leave (>1 year) and a group on short-term sick leave (2-6 months).

Method

The patients were recruited consecutively from a register listing persons on sick leave, managed by the National Insurance Authority in a Swedish city (Uppsala). Nine patients declined to participate in the study. A total of 72 patients agreed to participate. They were selected so that half of the patients (*n*=36) were on long-term sick leave (>12 months, *M*=26 months) at the start of the program, and the other half (*n*=36) were on short-term sick leave (2-6 months, *M*=3 months). All patients were women and they were diagnosed as having musculoskeletal pain. Most of them had neck- and shoulder pain (58%) or lower back pain (29%). The average duration of pain for the patients on long-term sick leave was 48 months, and for the patients on short-term sick leave it was 10 months. The mean age was 46 years (*SD*=9 years). The majority (61%) had completed compulsory school education, 25% had high school education, and 14% had a university degree. The amount of immigrants was 25%, and 61% of these were non-European. All patients were employed and the dominating work fields for the patients were nursing, cleaning, administration, restaurant work, and shop assistance. The patients on long-term (*n*=36) and short-term sick leave (*n*=36) were randomly assigned to a treatment group or to a treatment-as-usual control group, which resulted in four conditions (treatment/long-term, control/long-term, treatment/short-term, control/short-term) with 18 patients in each condition.

The treatment program was given at the Department of Psychology at Uppsala University and consisted of twelve weekly group sessions led by a clinical psychologist trained in CBT. Each session was 2.5 hours long and there were six patients in each group. The program first included teaching of coping strategies like applied relaxation, stress management, graded activity training, pacing, social skills training, problem solving, and cognitive techniques. Thereafter, the patients were taught how to manage difficulties when returning to work, and how to generalize coping strategies to different risk factors at their work places for pain. Risk factors included were, for example, repetitive body movements, stress due to time urgency, work dissatisfaction and conflicts. Planning of return to work was conducted together with rehabilitation administrators at the National Insurance Authority, and the aim was that all patients would return to work during the treatment program. Most patients started with occupational training while still on sick leave. Two booster sessions were provided after the end of the program (one and three months after the program), and the therapist also called the patients individually six times for about 15 minutes per phone call. The control condition received treatment-as-usual, which primarily meant seeing a physician and a physiotherapist a couple of times. Treatment-as-usual was also available for the treatment group during the program. No significant difference between the treatment and the control group was found for how many times they engaged in treatment-as-usual interventions.

The measurement occasions were pre-treatment, post-treatment, and a 6-month follow-up. Objective data on sick leave from the National Insurance Authority consisted of number of days on sick leave over periods of two months, which meant a maximum of 60 days per period. The other outcome measures consisted of established self-report inventories like the MPI (Bergström, Jensen, Bodin, Linton, Nygren, & Carlsson, 1998; Kerns et al., 1985), the CSQ (Jensen & Linton, 1993; Rosenstiel & Keefe, 1983), the BDI (Beck, Rush, Shaw, & Emery, 1979), the DRI (Salén et al., 1994), and the Pain and Impairment Rating Scale (PAIRS) (Riley, Ahern, & Follick, 1988). The attrition rate was 3% for sick leave and 8% for the other outcome measures. Treatment effects were analyzed separately for the patients on long- and short-term sick leave with ANOVAs, and Tukey's post hoc test was used to analyze differences between groups and measurement occasions. Between-groups effect sizes (ES) were computed with Cohen's *d*. The sign test (Siegel, 1956) was used as a type of ”overall” analysis to compare the change scores for all outcome measurement scales (except sick leave) between pre-treatment and post-treatment and between pre-treatment and 6-month follow-up for the treatment and control groups. The groups of patients on long- and short-term sick leave were analyzed separately.

Results

A significant interaction effect (Group x Time) was found on sick leave in favor of the treatment group for the patients on short-term sick leave, but not for the patients on long-term sick leave (see Table 4).

Table 4. Means (*SD*) for number of days on sick leave over two months periods for the treatment and control groups at pre-treatment, post-treatment, 4-month follow-up (FU 1), and 6-month follow-up (FU 2). The groups of patients on short- and long-term sick leave have been analyzed separately. ANOVA *F*-values for the interaction effects (Group x Time) are shown.

Group	Pre *M* (*SD*)	Post *M* (*SD*)	FU 1 *M* (*SD*)	FU 2 *M* (*SD*)	*df*	*F*-values
Treatment/short	57.4 (4.9)	38.9[a] (24.7)	25.4[b,d] (26.4)	21.0[c,d] (25.1)	(3,99)	2.78*
Control/short	55.1 (9.9)	45.5 (22.2)	37.2[b] (26.6)	39.7 (25.3)		
Treatment/long	52.6 (12.0)	49.9 (14.7)	49.4 (17.4)	49.4 (17.4)	(3,99)	0.49
Control/long	53.2 (11.7)	51.5 (11.9)	51.9 (11.3)	53.7 (10.5)		

* $P < 0.05$, a = significant difference between pre-treatment and post-treatment, b = significant difference between pre-treatment and 4-month follow-up, c = significant difference between pre-treatment and 6-month follow-up, d = significant difference between treatment and control group in favor of the treatment group at that measurement occasion, all *P*'s < 0.05.

Tukey's post hoc test showed that the number of days on sick leave significantly decreased for the treatment group on short-term sick leave from pre-treatment to the follow-ups. Their controls significantly decreased their number of days on sick leave from pre-treatment to the 4-month follow-up, but not from pre-treatment to the 6-month follow-up. The treatment group on short-term sick leave had a significantly lower number of days on sick leave compared to their controls at the 4-month follow-up (ES=0.45) and at the 6-month follow-up (ES=0.74). The results for the four groups are shown graphically in Figure 2.

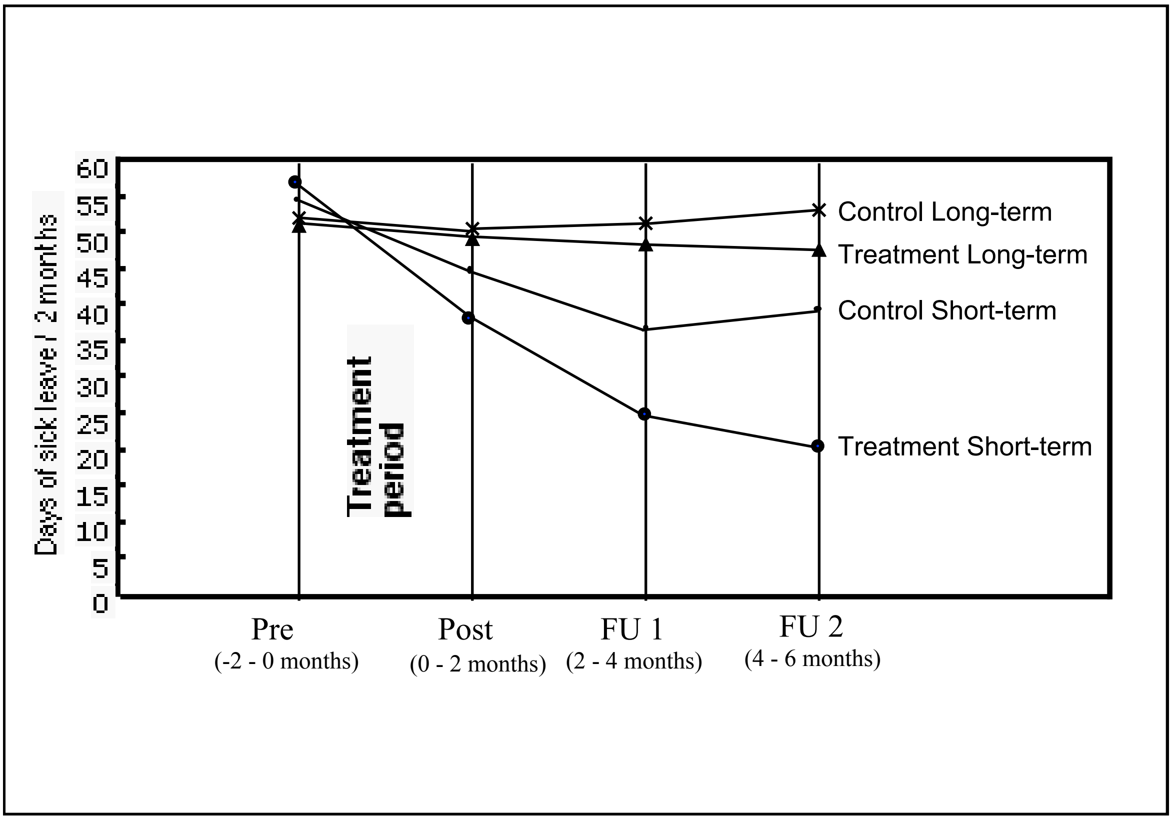

Figure 2. Number of days on sick leave over two months periods at pre-treatment (PRE), post-treatment (POST), follow-up 1 (FU 1) and follow-up 2 (FU 2) for the treatment and control groups at long- and short-term sick leave.

There were significant interaction effects (Treatment X Time) for the patients on short-term sick leave on the scales “Ability to decrease the pain” and “Control over the pain” of the CSQ (see Table 5). No significant changes were found on these scales from pre-treatment to post-treatment or to the 6-month follow-up for the treatment and control groups on short-term sick leave. However, significant differences between the treatment and control groups on short-term sick leave in favor of the treatment group were found at post-treatment and at the 6-month follow-up for the abilities to decrease and control the pain (Post-ES=1.05; FU-ES=1.32) and control the pain (Post-ES=0.62; FU-ES=1.49). There was a significant interaction effect (Treatment X Time) for the patients on short-term sick leave on the scale “General activity level” of the MPI (see Table 5). The treatment condition significantly increased the general activity level from pre-treatment to post-treatment and from pre-treatment to the 6-month follow-up, which the control condition did not (FU-ES=0.29). There was no significant interaction effect (Treatment X Time) for the patients on short-term sick leave on the DRI (see Table 5). However, the treatment group of patients on short-term sick leave decreased their experience of disability from pre-treatment to the 6-month follow-up, which their controls did not (FU-ES=0.03). There was no significant interaction effect (Treatment X Time) for the patients on short-term sick leave on the PAIRS (see Table 5). However, the treatment group of patients on short-term sick leave decreased their experience of pain and impairment from pre-treatment to post-treatment and from pre-treatment to the 6-month follow-up, which their controls did not (FU-ES=0.39). There were no significant interaction effects (Treatment X Time) for the patients on long-term sick leave on any of the inventories (see Table 5). The treated patients on long-term sick leave did not improve significantly on any of the outcome measures compared to their controls from pre-treatment to the follow-up.

Table 5. Means (*SD*) of all measures (except sick leave) for the treatment and control groups at pre-treatment, post-treatment, and 6-month follow-up (FU). The groups of patients on short- and long-term sick leave have been analyzed separately. ANOVA *F*-values for the interaction effects (Group x Time) are shown.

Measure	Group	Pre *M* (*SD*)	Post *M* (*SD*)	FU *M* (*SD*)	*df*	*F*-values
MPI (scores 0 - 6)						
Pain severity	Treatment/short	3.7 (1.3)	2.8^{a} (1.0)	2.9 (1.6)	(2,62)	0.60
	Control/short	3.7 (0.9)	3.2 (1.1)	3.2 (1.1)		
	Treatment/long	4.4 (1.1)	3.8 (1.3)	3.8 (1.4)	(2,62)	0.27
	Control/long	4.7 (1.1)	3.8^{a} (1.3)	4.0 (1.4)		
Interference	Treatment/short	4.1 (0.7)	3.1^{a} (0.8)	3.1^{b} (1.2)	(2,62)	0.94
	Control/short	4.1 (0.9)	3.3^{a} (1.1)	3.5 (1.1)		
	Treatment/long	4.2 (1.0)	3.6 (1.1)	3.5^{b} (1.2)	(2,62)	0.35
	Control/long	4.4 (0.9)	4.0 (1.0)	4.0 (0.9)		
Life control	Treatment/short	3.3 (0.9)	4.0 (0.7)	3.6 (1.0)	(2,62)	1.05
	Control/short	3.3 (1.1)	3.5 (1.0)	3.4 (1.1)		
	Treatment/long	3.3 (1.3)	3.3 (1.3)	3.3 (1.4)	(2,62)	2.46
	Control/long	2.5 (1.2)	3.4^{a} (0.9)	3.1 (1.2)		
Affective distress	Treatment/short	3.3 (1.4)	2.6 (1.3)	2.2^{b} (1.4)	(2,62)	0.92
	Control/short	3.1 (1.0)	2.3 (1.2)	2.1 (1.0)		

	Treatment/long	3.5 (1.7)	3.0 (1.4)	2.7[c] (1.7)	(2,62)	1.89
	Control/long	3.8 (1.7)	3.3 (1.5)	4.0 (2.6)		
Support	Treatment/short	4.9 (1.1)	4.2 (1.1)	4.1[b] (1.4)	(2,62)	0.79
	Control/short	4.7 (1.2)	4.5 (1.4)	4.3 (1.5)		
	Treatment/long	4.7 (1.4)	4.6 (1.0)	4.4 (1.1)	(2,62)	0.28
	Control/long	4.3 (1.5)	3.8 (1.8)	3.7 (1.6)		
Punishing responses	Treatment/short	0.9 (0.9)	1.0 (0.9)	1.0 (1.3)	(2,50)	0.49
	Control/short	0.8 (1.0)	0.8 (1.1)	1.1 (1.0)		
	Treatment/long	1.2 (1.6)	1.0 (1.2)	0.6 (0.7)	(2,58)	1.20
	Control/long	1.5 (1.4)	1.9 (1.8)	1.7 (1.2)		
Solicitous responses	Treatment/short	3.4 (1.0)	3.2 (1.0)	2.8 (1.1)	(2,50)	0.27
	Control/short	3.3 (1.3)	2.9 (1.5)	2.8 (1.4)		
	Treatment/long	3.8 (1.2)	3.3 (1.1)	3.2 (0.9)	(2,58)	0.30
	Control/long	3.8 (1.3)	3.0[a] (1.4)	3.0[b] (1.4)		
Distracting responses	Treatment/short	3.9 (1.2)	3.5 (1.4)	3.7 (1.2)	(2,50)	0.18
	Control/short	3.8 (1.5)	3.3 (1.6)	3.4 (1.5)		
	Treatment/long	3.7 (1.2)	3.6 (1.5)	4.0[c] (1.5)	(2,58)	1.73
	Control/long	3.4 (1.7)	2.8 (2.0)	2.7 (1.8)		
Household chores	Treatment/short	3.3 (1.1)	3.6 (0.9)	4.0 (0.8)	(2,60)	1.26
	Control/short	3.8 (1.3)	3.9 (1.1)	3.8 (1.2)		
	Treatment/long	3.7 (1.2)	3.7 (1.3)	3.7 (1.1)	(2,62)	0.17
	Control/long	3.4 (1.2)	3.4 (1.4)	3.5 (1.1)		
Outdoor work	Treatment/short	0.6 (0.7)	1.5[a] (1.7)	1.5[b] (1.5)	(2,60)	2.87
	Control/short	0.6 (0.8)	0.6 (0.7)	1.0 (1.1)		
	Treatment/long	0.6 (0.7)	1.2 (1.4)	1.4 (1.4)	(2,62)	0.13
	Control/long	0.4 (0.5)	1.2 (1.8)	1.2 (1.8)		
Activities away from home	Treatment/short	2.3 (0.9)	3.0 (1.5)	3.0 (1.4)	(2,60)	3.52*
	Control/short	3.0 (1.6)	2.7 (1.6)	2.7 (1.7)		
	Treatment/long	2.9 (1.1)	2.8 (1.3)	3.1 (1.5)	(2,62)	0.53
	Control/long	2.0 (1.4)	2.5 (1.5)	2.5 (1.7)		
Social activities	Treatment/short	2.6 (1.2)	3.0 (1.3)	3.0 (1.2)	(2,60)	0.65
	Control/short	3.0 (1.2)	3.0 (0.9)	3.2 (1.3)		
	Treatment/long	2.7 (1.2)	2.8 (1.3)	2.7 (1.1)	(2,62)	1.62
	Control/long	2.7 (1.2)	2.1 (0.8)	2.5 (1.0)		
General activity level	Treatment/short	2.2 (0.5)	2.8[a] (0.8)	2.9[b] (0.7)	(2,60)	4.57*
	Control/short	2.6 (0.8)	2.6 (0.6)	2.7 (0.7)		
	Treatment/long	2.5 (0.7)	2.6 (0.9)	2.7 (0.7)	(2,62)	0.02
	Control/long	2.1 (0.7)	2.3 (0.9)	2.4 (1.2)		
CSQ (scores 0 - 36)						
Diverting attention	Treatment/short	16.2 (8.2)	16.6 (6.5)	15.5 (7.6)	(2,62)	0.46
	Control/short	14.8 (7.8)	14.3 (6.7)	15.2 (7.5)		
	Treatment/long	16.4 (7.9)	15.5 (7.1)	16.3 (7.2)	(2,60)	2.13
	Control/long	18.5 (7.8)	15.3 (9.8)	13.8 (9.2)		

Reinterpret pain sensa-tions	Treatment/short	5.1 (3.7)	7.7 (6.4)	7.6 (7.2)	(2,62)	3.30*
	Control/short	7.5 (7.2)	5.1 (6.2)	6.5 (5.6)		
	Treatment/long	9.4 (8.2)	9.8 (10.5)	10.4 (9.0)	(2,60)	0.03
	Control/long	6.7 (5.6)	7.1 (7.9)	7.1 (5.7)		
Coping self-statements	Treatment/short	16.5 (6.5)	16.5 (7.5)	16.5 (6.6)	(2,62)	0.21
	Control/short	16.8 (5.6)	15.6 (8.1)	16.6 (5.3)		
	Treatment/long	20.3 (7.7)	19.1 (7.8)	18.7 (6.1)	(2,60)	0.22
	Control/long	18.7 (7.5)	18.6 (8.1)	16.9 (7.6)		
Ignore pain sensations	Treatment/short	13.6 (7.1)	13.7 (6.6)	14.4 (5.1)	(2,62)	1.98
	Control/short	15.9 (6.4)	12.8 (6.2)	13.1 (6.3)		
	Treatment/long	15.0 (6.4)	14.7 (9.2)	14.1 (7.0)	(2,60)	0.20
	Control/long	14.1 (7.0)	13.5 (6.5)	11.9 (6.2)		
Praying and hoping	Treatment/short	13.1 (6.4)	11.5 (8.3)	11.0 (8.6)	(2,62)	0.15
	Control/short	13.2 (6.4)	11.8 (6.8)	12.2 (6.5)		
	Treatment/long	13.8 (10.0)	11.6 (8.9)	10.6 (7.0)	(2,60)	1.28
	Control/long	11.6 (6.2)	12.1 (7.6)	11.2 (7.9)		
Catastrophizing	Treatment/short	15.7 (6.4)	8.9^{a} (6.4)	10.3^{b} (6.5)	(2,62)	2.56
	Control/short	14.8 (5.0)	11.6 (6.3)	9.2^{b} (4.8)		
	Treatment/long	17.7 (7.7)	13.4^{a} (7.7)	12.8^{b} (8.7)	(2,60)	0.54
	Control/long	17.4 (7.0)	12.9^{a} (7.0)	10.6^{b} (6.9)		
Increase activity level	Treatment/short	18.7 (4.9)	20.1 (4.5)	18.2 (6.0)	(2,62)	1.75
	Control/short	19.0 (6.2)	17.6 (4.2)	18.1 (4.4)		
	Treatment/long	19.5 (5.7)	20.1 (5.6)	18.4 (5.7)	(2,60)	1.59
	Control/long	20.1 (4.8)	17.7 (7.3)	17.7 (8.0)		
Increase pain behaviors	Treatment/short	19.6 (3.5)	20.6 (4.2)	19.6 (5.2)	(2,62)	2.07
	Control/short	19.8 (4.5)	18.1 (3.5)	19.5 (5.4)		
	Treatment/long	21.5 (5.8)	20.8 (5.4)	20.3 (5.2)	(2,60)	1.72
	Control/long	23.9 (5.7)	21.9 (5.4)	19.7^{b} (5.0)		
(scores 0 - 6)						
Control over the pain	Treatment/short	3.3 (0.8)	3.9 (0.7)	4.1^{c} (1.0)	(2,62)	3.33*
	Control/short	2.6 (1.5)	3.1 (1.7)	2.2 (1.5)		
	Treatment/long	3.0 (1.3)	3.1 (1.3)	3.0 (1.6)	(2,60)	0.19
	Control/long	3.2 (1.4)	3.3 (1.0)	2.9 (1.5)		
Ability to decrease the pain	Treatment/short	3.2 (1.2)	3.9^{c} (0.6)	3.8^{c} (0.9)	(2,62)	5.31**
	Control/short	3.2 (0.9)	2.9 (1.2)	2.4 (1.2)		
	Treatment/long	2.6 (0.9)	2.8 (1.3)	2.9 (1.2)	(2,60)	2.52
	Control/long	3.5 (1.3)	2.9 (1.3)	2.8 (1.4)		
BDI (scores 0 - 63)						
Depression	Treatment/short	11.3 (6.9)	9.9 (7.9)	10.8 (7.6)	(2,62)	0.12
	Control/short	9.2 (4.7)	8.6 (4.8)	9.4 (3.3)		
	Treatment/long	14.8 (11.9)	10.6 (5.7)	10.8 (8.1)	(2,60)	1.12
	Control/long	17.0 (10.5)	16.2 (8.2)	12.5 (5.9)		

DRI (scores 120 - 0)						
Activities of daily living	Treatment/short	71.6 (14.1)	58.0 (16.9)	56.0[b] (18.4)	(2,62)	0.46
	Control/short	65.9 (22.4)	53.0 (26.7)	56.6 (23.4)		
	Treatment/long	72.7 (17.9)	69.8 (22.2)	62.4[c] (26.4)	(2,62)	0.32
	Control/long	82.4 (15.3)	77.9 (21.8)	75.3 (15.4)		
PAIRS (scores 0 - 90)						
Impairment and fear-avoidance	Treatment/short	62.0 (8.3)	53.7[a] (8.7)	55.2[b] (10.2)	(2,62)	0.61
	Control/short	63.5 (9.4)	57.5 (13.7)	60.0 (14.3)		
	Treatment/long	64.0 (10.1)	56.3[a] (11.4)	58.4 (14.9)	(2,60)	1.92
	Control/long	61.9 (8.9)	60.0 (6.8)	61.0 (9.1)		

$P < 0.05$, * * $P < 0.01$, a = significant difference between pre-treatment and post-treatment, b = significant difference between pre-treatment and follow-up, c = significant difference between treatment and control group in favor of the treatment group at that measurement occasion, all *P's* < 0.05.

When all outcome measures (except sick leave) were combined a significant difference (p<0.01) between the treatment and control groups in favor of the treatment group was found from pre-treatment to follow-up for the patients on short-term sick leave but not for the patients on long-term sick leave.

Conclusions

We conclude that the cognitive-behavioral return-to-work program was effective in helping the pain patients on short-term sick leave back to work and teaching them coping strategies. The patients on long-term sick leave did not return to work after the program. This study shows that the time of intervention is important and that an early return-to-work focused rehabilitation can prevent long-term sick leave and disability.

Study III

Introduction and aim

The assessment of obstacles to return to work for chronic pain patients connected to the workplace is an undeveloped field. There are questionnaires that investigate work satisfaction or work content (Bergner, 1981; Karasek, Schwartz, & Theorell, 1982). However, these are often nonspecific to pain patients or do not concentrate on obstacles to return to work. There exist two screening questionnaires for patients with acute pain to predict sick leave and they include some items about the work place (Hazard, Haugh, Reid, Preble, & MacDonald, 1996; Linton & Halldén, 1998).

Many studies have investigated factors that predict sick leave and work return for pain patients. Different factors like psychological, physical, socioeconomic, and work-oriented factors have been under investigation. Examples of risk factors identified for not returning to work are ongoing depression, a high pain intensity, a high grade of fear-avoidance beliefs (Linton & Halldén, 1998; Sanders, 1995), a low job satisfaction (Hansenbring, Marienfeld, Kuhlendahl, & Soyka, 1994), lack of pathophysiological findings (Lancourt & Kettelhut, 1992), receiving workers' compensation (Gatchel, Polatin, & Mayer, 1995; Lancourt & Kettelhut, 1992), and being on long-term sick leave (Bendix et al., 1998; Vendrig, 1999). Fishbain et al. (1993) reviewed 26 prediction studies of work return after rehabilitation and concluded that future prediction literature may need to focus more on work variables. Ekberg and Wildhagen (1996) have shown that long-term sick leave is largely associated with work conditions rather than with individual characteristics. Psychosocial aspects of work, such as job satisfaction, have further been found to have a larger impact on return to work than more physical requirements of the job (van der Giezen, Bouter, & Nijhuis, 2000).

It is important for the clinician working with rehabilitation to understand what individual obstacles there are for return to work, so that the patient can be taught adaptive coping strategies for these. It is also of importance to identify patients at risk for long-term problems, since an early cognitive-behavioral return-to-work intervention like the one in study II might not be available to all pain patients for practical reasons.

The aim of study III was therefore to develop and evaluate a questionnaire (the Obstacles to Return-to-work Questionnaire, the ORQ) for identifying obstacles to return to work. It was hypothesized that these obstacles would predict sick leave.

Method

The study included 154 patients with diagnosed chronic musculoskeletal pain who were recruited consecutively from rehabilitation clinics in three Swedish cities (Uppsala, Örebro, and Sandviken) and from a register listing persons on sick leave at the National Insurance Authority in Uppsala. Most of them had neck- and shoulder pain (58%) or lower back pain (25%). The average duration of pain was 35 months (*SD*=37 months). The mean age of the total group consisting of 81% women and 19% men was 45 years (*SD*=9 years). Most of them (52%) had only a compulsory school education, 34% had a high school education, and 14% had a university degree. Of the patients, 12% consisted of immigrants and of these 58% were non-European. All patients were on sick leave and the average length was 15 months (*SD*=18 months). The majority (73%) had permanent employment, 4% had time-limited employment, and 23% were unemployed. The dominating work areas were nursing, factory work, administration, cleaning, restaurant work, and shop assistance.

The original questionnaire had 87 items and was divided into three parts. It was called the ORQ. Part I concerned depression and pain intensity, part II included obstacles to return to work at the work place and in the family situation and part III included items about motivation to return to work. The items of part I were mainly taken from the Örebro Musculoskeletal Pain Screening Questionnaire (Linton & Halldén, 1998). The items of part II were based on epidemiological research about physical (Hoogendoorn et al., 1999) and psychosocial (Ekberg et al., 1995; Hoogendoorn et al., 2000) risk factors for pain at the work place. Some of the items of part III were taken from the Örebro Musculoskeletal Pain Screening Questionnaire (Linton & Halldén, 1998). Each item was answered on a 7-point scale (0-6) with text at both ends. The patients filled in the ORQ once together with other self-report inventories like the MPI (Bergström et al., 1998; Kerns et al., 1985), the CSQ (Jensen & Linton, 1993; Rosentsiel & Keefe, 1983), the BDI (Beck et al., 1979), and the DRI (Salén et al., 1994). Objective data on sick leave was obtained from the National Insurance Authority nine months after the patients had filled in the ORQ, and consisted of number of days on sick leave over a two month period (the months between seven months after assessment to nine months after assessment). All 154 patients completed the ORQ. The attrition rates for the other measures were MPI (1%), BDI (0.01%), CSQ (0.01%), DRI (19%), and sick leave (2%). To identify subscales of the ORQ and to reduce items a varimax rotated orthogonal principal components factor analysis was conducted. Correlation was used to test the reliability of the ORQ and to compare ORQ with the other questionnaires. To investigate if the ORQ could predict sick leave a forward stepwise discriminant analysis was conducted.

Results

Separate factor analyses were conducted on the three parts of the ORQ. Only factors with eigenvalues above 1 were included. In the interpretation of factor loadings, ≥0.40 was considered salient. For part I of the ORQ a solution of two factors was chosen, which accounted for 55.7% of the total variance. For part II a solution of six factors was chosen, and this solution accounted for 37.7% of the total variance. For part III a solution of one factor was chosen, which accounted for 65.9% of the total variance. The explained variance for each factor is shown in Table 6. The ORQ was then reduced to include 55 items grouped into 9 scales (see Table 6). The internal reliability of the scales was satisfying with Cronbach's alphas varying between 0.52 and 0.83, and test-retest reliability varying between 0.77 and 0.96 (see Table 6).

Table 6. Name, number of reduced items, Cronbach's alpha, and test-retest reliability for each scale of the ORQ. Explained variance for each factor of the three separate factor analyses on part I, II and III of the ORQ.

Scales (Factors)	Number of items	Cronbach's alpha	Test-retest	Explained variance (%)
Part I				
Depression	4	0.81	0.80	41.5
Pain intensity	4	0.75	0.77	14.2
Part II				
Difficulties at work return	8	0.66	0.90	12.1
Physical workload and harmfulness	8	0.83	0.96	8.3
Social support at work	6	0.80	0.86	5.3
Worry due to sick leave	3	0.52	0.85	4.3
Work satisfaction	9	0.76	0.93	4.1
Family situation and support	7	0.73	0.90	3.6
Part III				
Perceived prognosis of work return	6	0.72	0.91	65.9

In order to determine the predictive validity of the ORQ a discriminant analysis was conducted with sick leave nine months after assessment as the outcome. The sick leave variable was dichotomized into a group having "little sick leave" (30 days or less of sick leave over the two month period) and a group with "substantial sick leave" (more than 30 days of sick leave over the two month period). The discriminant analysis was significant (Wilk's Lambda=0.722, p<0.00001). The scales "Perceived prognosis of work return ", "Social support at work", "Physical workload and harmfulness", "Depression", and "Pain intensity" could significantly predict sick leave and correctly classified 79% of the patients. The specificity (classifying a person having little sick leave as having little sick leave) was 44%, and the sensitivity (classifying a person having substantial sick leave as having substantial sick leave) was 90%. Discriminant analyses were also performed with sick leave as outcome variable on the other self-report inventories separately. The analyses were significant for the MPI (Wilk's Lambda=0.833, $p<0.01$), with a specificity of 15% and a sensitivity of 97%, and for the DRI (Wilk's Lambda=0.961, $p<0.05$) with a specificity of 3% and a sensitivity of 98%. For the CSQ and the BDI the analyses were not significant.

Table 7. Examples of the effect of various cut-off scores on prediction of prognosis.

	% Correctly classified (days of sick leave)	
Cutoff score	0-30 (specificity)[a]	31-60 (sensitivity)[b]
140	50	75
150	68	68
160	82	59
170	94	48
180	94	33

[a] percentage with indicated score and below; denotes specificity i.e. correctly classified as having little sick leave
[b] percentage with indicated score and above; denotes sensitivity i.e. correctly classified as having substantial sick leave

For clinical use, a total score analysis with cut-off scores was conducted for the ORQ (see Table 7). The patients were divided into two groups based on their amount of sick leave as above. Total score distributions were generated for each group to evaluate overall differences and cut-off points. The group of patients that had little sick leave (0-30 days of sick leave over a two months period) had a mean score of 132 (*SD*=32) with a range of 65-183. The patients that had substantial sick leave (31-60 days of sick leave over a two months period) had a mean score of 167 (*SD*=35) with a range of 97-243. The two groups' total score differed significantly (*t* (149)=-5.17, p<0.00001) (ES=1.04). With a cut-off score of 150, 68% of the population with a good prognosis would be identified and 68% of the population with a poorer prognosis would also be identified (see Table 7).

Conclusions

The ORQ showed satisfactory psychometric properties and has also been shown to be a relatively good predictor of sick leave. The results suggest that patients' perceptions and beliefs about work and returning to work may be a significant hindrance for actual recovery. The instrument might add useful information in the assessment of pain patients and might also be used to improve occupational rehabilitation.

DISCUSSION

Discussion of the individual studies

Study I

The two outcome studies reported show that cognitive behavioral multidisciplinary pain management programs can successfully be applied to Swedish pain patients. The evaluation of the 4-week inpatient program given at a rehabilitation clinic showed that the program had effects on sick leave, return to work and psychological variables like pain intensity, mood, and ability to perform activities of daily living.

It is difficult to compare the present results for sick leave with international outcome studies, since most studies only report the results for work return and not for sick leave per se. However, when comparing the present results for work return at follow-up, for the patients who were on full-time sick leave at pre-treatment, a fair amount of agreement is shown with the results from the meta-analysis by Cutler et al. (1994). In our study 49% of the patients on full-time sick leave at pre-treatment had returned to work at the 1-year follow-up, and in the meta-analysis 41% of the patients had returned to work about one year after treatment. Since most of the reduction of sick leave at follow-up in the second study consisted of a return to work and not in unemployment, and that one third of the patients on full-time sick leave at follow-up underwent occupational training, these results can be seen as an improvement in actual occupational activity. The results from the first study confirm this notion with a significant difference in favor of the treatment group for occupational training at the 1-month follow-up and a between-group effect size of 1.20. In Sweden, occupational training is also used as the first step back to work after a longer period of sick leave. The result for work return is not as good as the result reported in the meta-analysis of Flor et al. (1992), which reported that 68% of the treated patients returned to work.

It is noteworthy that the pain patients in the present study had a lower rate of unemployment (39%) at pre-treatment than the pain patients in the outcome studies by Richardson, Richardson, Williams, Featherstone, and Harding (1994) (74%) and Vlayen et al. (1995) (90%). This does not seem to be a consequence of differences in patient disability, but is more likely a consequence of Swedish vocational security laws. It would have been interesting to know how many of the unemployed patients at pre-treatment actually had returned to work at the 1-year follow-up, but unfortunately we did not check for that.

The improvements of pain intensity and interference, use of analgesics, pain behaviors, catastrophizing, depressive mood, and daily activity level shown in the present studies are in line with international outcome studies (Flor et al. 1992; Vlayen et al. 1995; Williams et al., 1996). However, all of those studies did not find a reduction of pain intensity (Vlayen et al., 1995; Williams et al 1996), which also can be seen in the first study in the present outcome study. The reduction of "Pain behaviors" as measured by the CSQ could be questioned, mainly because of the characteristics of the scale (Rosenstiel & Keefe, 1983). For example, relaxation and walking are viewed as pain behaviors, which often are important aspects of pain management. However, the reduction of "Catastrophizing" on the CSQ may be more valid, since it is linked with signs of depression as measured by the BDI (Sullivan & D´Eon, 1990). The results for the "activity scales" of the MPI differ slightly between the first study and the second study, and the results were not maintained at 1-year follow-up. One explanation may be that these scales may be less valid for Swedish pain patients (Bergström et al., 1998) than for patients in studies conducted in the USA (e.g., Rosenstiel & Keefe, 1983).

An interesting question is whether decreased sick leave is a consequence of more adaptive coping strategies, resulting in psychological improvements like decreased pain intensity and symptoms of depression, or if decreased sick leave and return to work cause psychological improvements. In the first study, effects of the treatment were found at post-treatment, i.e., before returning to work or occupational training. In the second study, the existing post-treatment measures for pain intensity ratings on VAS and coping strategies like "catastrophizing", "praying and hoping" and "increased pain behaviors" indicate that the improvements had already occurred at post-treatment. This leads to the conclusion that it is the improvement of psychological factors that has led to decreased sick leave. Thus, it may be that the individuals' increased use of coping strategies may facilitate return to work rather than return to work leading to better coping strategies. A transactional model of reciprocal associations is also plausible, i.e. a good circle vs. a vicious circle. This notion is supported of the long-term effects observed in the second study.

The patient population in the present studies was severely impaired with a pain duration of 11 years in average and a sick leave duration of 3.5 years in average. This suggests that the effects of the treatment program could be generalized to other pain clinics in Sweden. Moreover, the program might work even better with less impaired pain patients (Turk & Rudy, 1990). The number of immigrants included in this study was rather low (12%) compared to other urban areas in Sweden. The results may therefore not be generalizable to a clinical population with a higher proportion of immigrants. No significant gender differences were found on any of the outcome measures, suggesting that the treatment worked equally well for both sexes. However, this is not in line with other Swedish studies. Jensen et al. (1994) found that the positive effects of a cognitive-behavioral multidisciplinary program for chronic spinal pain were limited to females only. Jensen et al. (2001) also found the positive effects of another cognitive-behavioral multidisciplinary program to be limited to women. Lindström et al. (1992) showed that a graded activity program for patients with subacute low back pain decreased sick leave for men but not for women.

The present studies have some limitations. One study was controlled and the other was a non-controlled study with consecutive patients and a long-term follow-up. The lack of a control group in the second study could be seen as a methodological weakness. However, discussing the effects of psychotherapy, Seligman (1995) stated that outcome studies of treatments conducted in actual clinical settings without control groups could add useful and credible validation of controlled research. Considering the long duration of pain and sick leave in the present studies, the results for sick leave are most likely not due to spontaneous remission or a more restrictive attitude towards allowing sick leave. Another limitation is that the response rate in the second study varied for most of the outcome measures, as some patients did not participate in the follow-up assessments. However, we were able to collect data on sick leave at 1-year follow-up for most patients from their medical records. An analysis of attrition did not show any significant differences regarding levels of sick leave at pre-treatment and 2-month follow-up between those who completed the 1-year follow-up and dropouts.

Although many of the patients in study I decreased their sick leave and returned to work after the treatment program, there still remained some who did not return to work and/or were on sick leave. One reason, according to Linton (1995), is that pain management programs have regarded the workplace as something to return to, rather than an integral part of comprehensive interventions (Linton, 1995). An important improvement of pain management programs could be to integrate psychosocial and physical risk factors (found in epidemiological studies) of the workplace into the treatment (Ekman, 1995). One way to enhance generalization and maintenance of coping strategies acquired during treatment would be to encourage the patients to practice them at their own workplace under therapeutic supervision. Another way of enhancing treatment outcome may be to match the treatment interventions to different subgroups of patients better (Rudy, Turk, Kubinski, & Zaki, 1995). Hopefully, primary and secondary prevention of musculo-skeletal pain will be used more often in the future, so that severely disabled patients either do not develop severe problems with long-term sick leave or receive rehabilitation at an earlier stage.

Study II

This study shows that an out-patient cognitive-behavioral program focused on return to work conducted by a psychologist is more effective than treatment-as-usual for chronic pain patients on short-term (2-6 months) sick leave but not for patients on long-term (>12 months) sick leave. The treatment program significantly reduced sick leave and helped the patients on short-term sick leave back to work. The program also increased these patients' coping ability and activity level and decreased their experience of disability and impairment compared to the treatment-as-usual control condition. These results under-score the need for an early return-to-work orientated rehabilitation, which can also be more cost-effective than rehabilitation at a later stage.

An advantage of this study is that we know that all patients who reduced their sick leave also returned to paid work, since an inclusion criteria in this study was being gainfully employed and no patients became unemployed during the study. For the patients on short-term sick leave, both the treatment and the treatment-as-usual control condition significantly reduced the number of days on sick leave from pre-treatment to the follow-ups. However, the reduction in sick leave was twice as large for the treatment group com-pared to the controls at the 6-month follow-up. Of the treated patients on full-time sick leave at pre-treatment 72% had returned to work at the 6-month follow-up compared to 38% of the patients in the control condition, and the overall between-groups effect size was 0.74. This result for work return is almost exactly in line with the result of the meta-analysis of Flor et al. (1992), which reported that 68% of the treated patients had returned to work compared to 36% of the controls, and had a between-group effect size of 0.67. However, this meta-analysis was conducted on multidisciplinary pain management programs.

The difference in number of days on sick leave for the treatment group on short-term sick leave compared to their controls could have been expected to be significant earlier. One explanation for this lack of early difference was that many patients started with occupational training while still on sick leave. Another reason was that the planning for the return to work was delayed in most cases due the work conditions of the rehabilitation administrators at the National Insurance Authority. The significant reduction in sick leave for the control condition might be explained as spontaneous remission. Some of the patients had only been on sick leave for eight weeks at the beginning of the study, and the risk zone for not returning to work has been found to be around 12 weeks of sick leave (Linton & Bradley, 1996). This can probably also explain why the control group significantly reduced their catastrophizing and experience of pain interference. Some patients on short-term sick leave did not return to work after the program. An interesting question is how the results would have been had these patients been treated before they went on continuous sick leave. An even earlier rehabilitation might have helped the patients who did not return to work (Linton & Andersson, 2000; Von Korff et al., 1998).

It was expected that the treated patients on short-term sick leave would return to work to a greater extent than the patients on long-term sick leave (Bendix et al., 1998; Hildebrandt et al.,1997; Vendrig, 1999). More unexpected was that the treated patients on long-term sick leave did not reduce their sick leave more than their controls. One reason is probably that an out-patient unidisciplinary program was not comprehensive enough for these patients (Williams et al., 1996). Another explanation is that this type of return-to-work focused program in co-operation with the National Insurance Authority was too threatening to these patients due to their more established sick roles (Linton et al., 1984).

This can also explain why the treated patients on long-term sick leave did not improve on almost any of the psychological outcome measures.

The improvements in coping with pain and activity level for the treated patients on short-term sick leave were expected (Morley et al., 1999). The non-significant result on the BDI might be explained by a low level of depression at pre-treatment. However, the results on the rest of the psychological outcome variables could have been expected to be significantly better for the treatment group compared to the control group. One explanation is that the treatment program was mainly focused on return to work and not on improving psychological outcome variables. It might also be that the 6-month follow-up was too short to detect delayed effects of a CBT intervention, such as improved physical ability, which Keefe et al. (1999) did not find until a 1-year follow-up. Another reason could be that the statistical power was too low in this study. The meta-analysis of Morley et al. (1999) shows that some psychological outcome measures had between-groups effect sizes below 0.50. Such moderate effect sizes are in line with the results of the present study, i.e. the study lacked the power to detect these between-groups differences. However, since the differences between the treatment and the control group were so modest on some outcome measures, a reasonable increase in number of subjects might not have yielded more significant group differences, or these differences would not have been clinically meaningful.

The present study has limitations. The treatment was conducted by one psychologist only, which could reduce the possibility of generalizing the results to other psychologists. However, the clinical psychologist in this study did not have a certificate as psychotherapist, which means that these results might be obtainable for other clinical cognitive-behavioral psychologists without the specialization as psychotherapist. A treatment manual was followed for each session, but no treatment adherence checks were conducted. As mentioned above the follow-up period could preferably have been longer than 6 months. It appears that the return-to-work rate may increase with longer follow-up assessment periods (Turk, 1996), so hopefully the promising results for work return would have been the same or better if we have had a longer follow-up period. This study did not include any unemployed patients, because we considered them as a group in need of special interventions (Kendall & Thompson, 1998). Due to practical reasons no men were included, so we can not know if the program works as well for men. Thus, the study needs to be replicated in different settings and with more patients of both sexes before the results can be generalized.

In conclusion, the cognitive-behavioral return-to-work program was effective in helping patients on short-term sick leave back to work. This study shows that the time of intervention is important and that an early return-to-work focused rehabilitation can prevent long-term sick leave and disability. Needed research in the future are long-term follow-ups, replications, and development of return-to-work oriented interventions for patients on long-term sick leave.

Study III

In this study a screening instrument, the Obstacles to Return-to-work Questionnaire (the ORQ), was developed and evaluated. The ORQ showed satisfactory psychometric properties and showed to be a relatively good predictor of sick leave. The instru-ment might add useful information in the assessment of pain patients and might also be used to improve occupational rehabilitation.

Three separate factor analyses were used to analyze the original inventory. The purpose of conducting separate analyses was to reduce the number of items in proportion to the number of patients. The factor solutions explained a reasonable amount of variance. The nine subscales showed satisfactory internal reliability except the scale “Worry due to sick leave” that only consisted of three items and had a low Cronbach’s alpha coefficient. However, all subscales showed high test-retest reliability. The validity of the ORQ was shown to be satisfactory compared to other well-established self-report inventories. The subscales that measured pain intensity, depression, and family support correlated highly with similar scales. The more work-oriented subscales like “Social support at work” or

“Physical workload and harmfulness” did not correlate very highly with the MPI, the CSQ, or the DRI. This indicates that the ORQ might enhance the pain assessment and the treatment planning by adding information about obstacles to return to work connected to the workplace.

This study has also shown that five subscales of the ORQ predict sick leave nine months after the questionnaire has been filled in of the patient. The subscale that best predicted sick leave was “Perceived prognosis of work return”, which is in accordance with Tan, Cheatle, Mackin, Moberg, and Esterhai (1997) who found that return-to-work motivation was the best predictor for work return. Other studies have also found that patients’ own beliefs about their work return are important for the outcome (Hildebrandt et al., 1997; Sandström & Esbjörnsson, 1986). The scale “Social support at work” significantly predicted sick leave, which is in accordance with other studies that have found a relationship between perceived low support at work and sick leave (Hazard et al., 1996; Symonds, Burton, Tillotson, & Main, 1996). The scale “Physical workload and harmfulness” also significantly predicted sick leave, which is in line with a study by Fishbain, Cutler, Rosomoff, Khalil, and Steele-Rosomoff (1997) that found perceived physical job demands and work danger perception complaints to predict employment status. Linton and Halldén (1998) have also found an association between the belief that work is dangerous and back pain disability. The scales “Depression” and “Pain intensity” significantly predicted sick leave, which is in accordance with other studies (Linton & Halldén, 1998; van der Giezen et al., 2000). Although reducing the number of subscales of the ORQ to only those identified as significant was tempting for the sake of brevity, the diversity of patients and problems might then reduce the validity of the questionnaire. These scales were therefore retained, and for clinical use we conducted a total score analysis to establish cut-off points on the accuracy to predict sick leave. The MPI and the DRI also significantly predicted sick leave and showed as good sensitivity as the ORQ did. However, these inventories do not include any specific work-oriented items and showed a lower specificity than the ORQ did. If one considers the chronic status of this population, specificity might be as important as sensitivity, since being able to identify the patients who will have “little sick leave” nine months later might mean identifying those who would benefit most from an occupational rehabilitation.

The sick leave variable was dichotomized for the discriminant analysis and the total score analysis into having “little sick leave” and having “substantial sick leave”. This dichotomy was chosen for clinical reasons, since there is a considerable difference between being on sick leave fifty percent or less and being on sick leave more than fifty percent. When comparing this dichotomy of the sick leave variable with other dichotomies, the results were almost identical and ORQ still showed better specificity than the other questionnaires.

In this study all patients were on sick leave at the start of the study and 23% of them were unemployed. We did not investigate if a low number of days on sick leave nine months after assessment actually meant that the patients had returned to a workplace, so we can’t say that predicting sick leave is exactly the same as predicting return to work. However, if the patients had reduced their sick leave but were unemployed, this means that these patients were at least at the disposal of the labor market. They would also be under consideration for governmental action programs for unemployed persons, which could increase their chances of getting an employment in the future.

The present study has some limitations. The factor analyses could have benefited from a higher number of patients. Another limitation concerns generalization of the results to male patients since the study included 81% women but only 19% men. However, the higher proportion of women mirrors the clinical pain population in general (Crombie et al., 1999). It is a limitation having a chronic sample when constructing items about work, since most of the patients have been on sick leave for a long time period and will probably respond to the items in a more general way. Any treatment the patients may have undergone after assessment was not controlled for. However, since most of them had participated in some sort of rehabilitation and only 22% were working half time or more nine months after the assessment, this would probably not have confounded the results for sick leave. The specificity of the ORQ could preferably have been higher than 44%. However, since musculoskeletal pain is often recurrent, the persons incorrectly identified as not having little sick leave, might be those at risk for recurrent episodes of pain and sick leave in the future.

To conclude, we have found the Obstacles of Return-to-work Questionnaire to be a rather good predictor of sick leave. Future research needs to investigate if the ORQ can also be of use in the planning of occupational rehabilitation.

General discussion and future research

This thesis has shown that CBT treatment for chronic musculoskeletal pain patients is effective in decreasing sick leave and helping patients to return to work. A multidisciplinary in-patient program can successfully be conducted at an ordinary rehabilitation clinic in Sweden. A return-to-work focused out-patient program led by a clinical psychologist is sufficient for many patients if given at an early point in time of sick leave. A questionnaire developed for identification of obstacles to return to work could significantly predict sick leave and might be used to improve assessment and treatment planning.

Study I shows that it is possible to generalize results from international evaluations of multidisciplinary CBT programs to Swedish conditions. Hopefully, this study will contribute to the implementation of CBT programs for musculoskeletal pain patients at Swedish rehabilitation clinics. Since most pain management programs are given as a treatment package studies are needed in the future to isolate the active components of these programs (Jensen et al., 2001; Turk & Rudy, 1990).

The result of study II calls for earlier interventions for chronic musculoskeletal pain patients to prevent future disability and high socioeconomic costs for sick leave benefits and treatment. Since the societal costs for sick leave are rapidly increasing in Sweden (Lidwall, 2001), cost-effective treatments like this are very urgent. However, an even earlier cognitive-behavioral treatment for patients with subacute/acute pain has also been shown to reduce future sick leave days (Linton & Andersson, 2000; Linton & Ryberg, 2001). More evaluations of early interventions for pain patients are needed. Interventions for chronic patients on long-term sick leave might also be improved if treatment could be coordinated more efficiently with the work place to facilitate a return to work.

Study III is a contribution to the development of more effective return-to-work programs for pain patients. If clinicians could assess what obstacles there are for a work return connected to the work place they could be able to make better treatment plans for their patients. However, the study may be seen as a first step in this direction and the questionnaire evaluated might need to be further developed and the results replicated. Bergström, Jensen, Bodin, Linton, and Nygren (2001) found that different MPI subgroups of pain patients had different amount of sick leave days after rehabilitation, which might call for individualization of the treatment planning according to these subgroups to improve return to work. However, these MPI subgroups (Turk & Rudy, 1988) do not include information on work-oriented obstacles for a work return as the ORQ does. It is also of interest to investigate if the ORQ can predict sick leave after a CBT program.

There are some methodological limitations common to the studies. All studies would probably have benefited from larger samples of patients. The meta-analysis of Morley et al. (1999) shows that many psychological outcome measures had between-groups effect sizes below 0.50. To detect these between-groups differences more power than in the present studies is needed, that is, the size of the sample has to be larger. The studies might also have benefited from having other types of measures of the psychological variables than only self-report measures, such as clinician ratings and behavior observations. Another limitation might be the selection of the samples, which could limit the generalization of the results. The samples in our studies were convenient clinical samples and not samples randomly drawn from all possible pain patients in Sweden. The studies would also have benefited from longer follow-up periods and a longer time for prediction. It is important to investigate whether the results are durable over time. These limitations call for future replications with larger randomized samples from a broader population of pain patients and with different types of outcome measures and longer follow-ups. However, in spite of the limitations the studies showed strong results for sick leave and return to work.

Another needed area of research is how to spread and implement the results from research into clinical use at rehabilitation facilities and primary care. To show promising outcome results of international and national evaluations of treatment programs and especially for work return is one way to attract interest from clinicians and politicians. If the researchers in addition can show how cost-effective a program is the interest for implementing the program might increase even more. Thomsen, Sörensen, Sjögren, and Eriksen (2001) show in a review study of cost-effectiveness studies of multidisciplinary pain management programs that this is an undeveloped field with considerable methodological problems. The treatment programs also have to be conducted at ordinary rehabilitation clinics as was done in Study I, so that clinicians can see that they work outside research departments.

CONCLUSIONS

- A multidisciplinary CBT program can be successfully applied to chronic musculoskeletal pain patients at an ordinary rehabilitation clinic in Sweden. Such treatment can significantly decrease sick leave and help patients to return to work, as well as improving psychological wellbeing and physical fitness.

- A unidisciplinary CBT program focused on return to work and conducted by a clinical psychologist can significantly reduce sick leave and help chronic musculoskeletal pain patients on short-term sick leave (2-6 months) back to work. The program also leads to better coping abilities. However, patients on long-term sick leave (>12 months) do not return to work or improve on psychological variables after this type of program.

- A questionnaire for identification of obstacles to return to work can significantly predict sick leave for chronic musculoskeletal pain patients. Important obstacles for a work return are how the patients' perceive their prognosis of a work return, the social support at the work place and how they perceive the physical workload and eventual harmfulness of their work. Other obstacles are pain intensity and depression. Assessment of obstacles to return to work might be used to improve treatment planning and be of help in selecting patients for treatment.

REFERENCES

Anderberg, U. M. (1999). Fibromyalgia syndrome in women – a stress disorder? Neurobiological and hormonal aspects. Acta Universitatis Upsaliensis. *Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine 815.*

Andersson, G. B. J. (1997). The epidemiology of spinal disorders. In J. W. Frymoyer (Ed.), *The adult spine: Principles and practice* (pp. 93-141). New York: Raven Press.

Asmundson, G. J. G., Norton, P. J., & Norton, G. R. (1999). Beyond pain: The role of fear and avoidance in chronicity. *Clinical Psychology Review, 19,* 97-119.

Bandura, A. (1969). *Principles of behavior modification*. New York: Holt, Rinehart & Winston.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. *Psychological Review, 84,* 191-215.

Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy of depression.* New York: Guilford Press.

Beck, A. T., Ward, C. H., Mendelson, M., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry, 4,* 561-571.

Bendix, A. F., Bendix, T., & Haestrup, C. (1998). Can it be predicted which patients with chronic low back pain should be offered tertiary rehabilitation in a functional restoration program? *Spine, 23*, 1775-1784.

Bergner, M., Bobbitt, R. A., Carter, W. B., & Gibson, B. S. (1981). The Sickness Impact Profile: Development and final revision of a health status measure. *Medical Care*, *19,* 787-805.

Bergström, G., Jensen, I. B., Bodin, L., Linton, S. J., Nygren, Å., & Carlsson, S. (1998). Reliability and factor structure of the Multidimensional Pain Inventory: Swedish language version (MPI-S). *Pain, 75,* 101-110.

Bergström, G., Jensen, I. B., Bodin, L., Linton, S. J., & Nygren, A. L. (2001). The impact of psychologically different patient groups on outcome after a vocational rehabilitation program for long-term spinal pain patients. *Pain, 93,* 229-37.

Block, A. R., Kremer, E. F., & Gaylor, M. (1980). Behavioral treatment of chronic pain. Variables affecting treatment efficacy. *Pain, 8,* 367-375.

Blumer, D., & Heilbronn, M. (1982). Chronic pain as a variant of depressive disease: The pain-prone disorder. *Journal of Nervous and Mental Disease, 170,* 381-406.

Bongers, P. M., de Winter, C. R., Kompier, M. A. J., & Hildebrandt, V. H. P. (1993). Psychosocial factors at work and musculoskeletal disease. *Scandinavian Journal of Work and Environmental Health, 19,* 297-312.

Brattberg, G., Thorslund, M., & Wikman, A. (1989). The prevalence of pain in a general population: The results of a postal survey in a county of Sweden. *Pain, 37*, 215-222.

Brown, G. K., Nicassio, P. M., & Wallston, K. A. (1989). Pain coping strategies and depression in rheumatoid arthritis. *Journal of Consulting and Clinical Psychology, 57,* 652-657.

Burns, J. W., Kubilus, A., Bruehl, S., & Harden, N. (2001). A fourth empirically derived cluster of chronic pain patients based on the Multidimensional Pain Inventory: Evidence for repression within the dysfunctional group. *Journal of Consulting and Clinical Psychology, 69,* 663-673.

Cairns, D., & Pasino, J. (1977). Comparison of verbal reinforcement and feedback in the operant treatment of disability of chronic low back pain. *Behavior Therapy, 8,* 621-630.

Carlsson, C. A., & Nachemson, A. (2000). Kirurgisk behandling av nacksmärta (Surgical treatment of neck pain). In SBU – Statens beredning för medicinsk utvärdering (The Swedish Council on Technology Assessment in Health Care), *Ont i ryggen, ont i nacken (Back pain, neck pain)* (pp. 195-204). Stockholm: SB Offset AB.

Claussen, B. (1999). Health and re-employment in a five-year follow-up of long-term unemployed. *Scandinavian Journal of Public Health, 27,* 94-100.

Comino, E. J., Harris, E., Silove, D., Manicavasagar, V., & Harris, M. F. (2000). Prevalence, detection, and management of anxiety and depressive symptoms in unemployed patients attending general practitioners. *Australian and New Zealand Journal of Psychiatry, 34,* 107-13.

Compas, B. E., Haaga, D. A. F., Keefe, F. J., Leitenberg, H., & Williams, D. A. (1998). A sampling of empirically supported psychological treatments from health psychology: Smoking, chronic pain, cancer, and bulimia nervosa. *Journal of Consulting and Clinical Psychology, 66,* 89-112.

Council, J. R., Ahern, D. K., Follick, M. J., & Kline, C. L. (1988). Expectancies and functional impairment in chronic low back pain. *Pain, 33,* 323-331.

Croft, P., Joseph, S., & Cosgrove, S. (1994). *Low back pain in the community and in hospitals. A report to the Clinical Standards Advisory Group of the Department of Health.* Prepared by the Arthritis & Rheumatism Council, Epidemiology Research Unit, University of Manchester.

Crombie, I. K., Croft, P. R., Linton, S. J., LeResche, L., & Von Korff, M. (1999). *Epidemiology of pain.* Seattle: IASP Press.

Cutler, R. B., Fishbain, D. A., Rosomoff, H. L., Abdel-Moty, E., Khalil, T. M., & Steele Rosomoff, R. (1994). Does nonsurgical pain center treatment of chronic pain return patients to work? A review and a meta-analysis of the literature. *Spine, 19,* 643-652.

Doleys, D. M., Crocker, M., & Patton, D. (1982). Response of patients with chronic pain to exercise quotas. *Physical Therapy, 62*, 1112-1115.

Ekberg, K. (1995). Workplace changes in successful rehabilitation. *Journal of Occupational Rehabilitation, 5*, 253-269.

Ekberg, K., Björkqvist, B., Malm, P., Bjerre-Kiely, B., Karlsson, M., & Axelson O. (1995). Cross-sectional study of risk factors for symptoms in the neck and shoulder area. *Ergonomics, 38*, 971-980.

Ekberg, K., & Wildhagen, I. (1996). Long-term sickness absence due to musculoskeletal disorders: The necessary invention of work conditions. *Scandinavian Journal of Rehabilitation Medicine*, *28*, 39-47.

Englund, L., & Svärdsudd, K. (2000). Sick-listing habits among general practitioners in a Swedish county. *Scandinavian Journal of Primary Health Care, 18,* 81-86.

Fedoravicius, A. S., & Klein, B. J. (1986). Social skills training in an outpatient medical setting. In A. D. Holzman and D. C. Turk (Eds.), *Pain management: A handbook of psychological treatment approaches* (pp. 86-99). New York: Pergamon Press.

Feuerstein, M., & Zastowny, T. R. (1996). Occuoational rehabilitation: Multidisciplinary management of work-related musculoskeletal pain and disability. In: R. J. Gatchel and D. C. Turk (Eds.), *Psychological Approaches to Pain Management: A practitioner's Handbook.* New York: Guilford Press.

Fishbain, D. A., Cutler, R. B., Rosomoff, H. L., Khalil, T., & Steele-Rosomoff, R. N. (1997). Impact of chronic pain patients' job perception variables on actual return to work. *Clinical Journal of Pain, 13*, 197-206.

Fishbain, D. A., Rosomoff, H. L., Goldberg, M., Cutler, R., Abdel-Moty, E., Khalil, T. K., & Steele-Rosomoff, R. (1993). The prediction of return to work after multidisciplinary pain center treatment. *Clinical Journal of Pain, 9,* 3-15.

Flor, H., Fydrich, T., & Turk, D. C. (1992). Efficacy of multidisciplinary pain treatment centers: A meta-analytic review. *Pain, 49*, 221-230.

Flor, H., & Turk, D. C. (1988). Chronic back pain and rheumatoid arthritis: Predicting pain and disability from cognitive variables. *Journal of Behavioral Medicine, 11,* 251-265.

Fordyce, W. E. (1976). *Behavioral methods for chronic pain and illness.* St Louis: CV Mosby.

Fordyce, W. E. (1995). *Back pain in the workplace*. Seattle: IASP Press.

Frank, J. W., Kerr, M. S., Brooker, A.-S., DeMaio, S. E., Maetzel, A., Shannon, H. S., Sullivan, T. J., Norman, R. W., & Wells, R. P. (1996). Disability resulting from occupational low back pain, *Spine, 21,* 2908-2917.

Gatchel, R. J., Polatin, P. B., & Mayer, T. G. (1995). The dominant role of psycho-social risk factors in the development of chronic low back pain disability. *Spine, 15,* 2702-2709.

Gentry, W. D., & Bernal, G. A. A. (1977). Chronic pain. In R. Williams & W. D. Gentry (Eds.), *Behavioral approaches to medical treatment* (pp. 171-182). Cambridge: Ballinger.

Goossens, M., van Tulder, M., & Hoving, J. (2000). Kronisk nacksmärta - konservativ behandling (Chronic pain – conservative treatment). In SBU – Statens beredning för medicinsk utvärdering (The Swedish Council on Technology Assessment in Health Care), *Ont i ryggen, ont i nacken (Back pain, neck pain)* (pp. 171-193). Stockholm: SB Offset AB.

Grzesiak, R. C., Ury, G. M., & Dworkin, R. H. (1996). Psychodynamic psychotherapy with chronic pain patients. In R. J. Gatchel and D. C. Turk (Eds.), *Psychological approaches to pain management: A practitioner's handbook* (pp. 148-178). New York: The Guilford Press.

Hansenbring, M., Marienfeld, G., Kuhlendahl, D., & Soyka, D. (1994). Risk factors of chronicity in lumbar disc patients. A prospective investigation of biologic, psychological, and social predictors of therapy outcome. *Spine, 19,* 2759-65.

Harms-Ringdahl, K., & Nachemson, A. (2000). Akut nacksmärta – konservativ behandling (Acute neck pain – conservative treatment). In SBU – Statens beredning för medicinsk utvärdering (The Swedish Council on Technology Assessment in Health Care), *Ont i ryggen, ont i nacken (Back pain, neck pain)* (pp. 149-170). Stockholm: SB Offset AB.

Harrison, J., Barrow, S., Gask, L., & Creed, F. (1999). Social determinants of GHQ score by postal survey. *Journal of Public Health Medicine, 21,* 283-88.

Hazard, R. G., Haugh, L. D., Reid, S., Preble, J. B., & MacDonald, R. T. (1996). Early prediction of chronic disability after occupational low back injury. *Spine , 21,* 945-951.

Heyneman, N. E., Fremouw, W. J., Gano, D., Kirkland, F., & Heiden, L. (1990). Individual differences in the effectiveness of different coping strategies. *Cognitive Therapy and Research, 14,* 63-77.

Hildebrandt, J., Pfingsten, M., Saur, P., & Jansen, J. (1997). Prediction of success from a multidisciplinary treatment program for chronic low back pain. *Spine, 22,* 990-1001.

Holmström, E. B, Lindell, J., & Moritz, U. (1992). Low back pain and neck/shoulder pain in construction workers: Occupational workload and psychosocial risk factors. *Spine, 17,* 672-677.

Hoogendoorn, W. E., van Poppel, M. N. M., Bongers, P. M., Koes, B. W., & Bouter, L. M. (1999). Physical load during work and leisure time as risk factors for back pain. *Scandinavian Journal of Environmental Health, 25,* 387-403.

Hoogendoorn, W. E., van Poppel, M. N. M., Bongers, P. M., Koes, B. W., & Bouter, L. M. (2000). Systematic review of psychosocial factors at work and in the personal situation as risk factors for back pain. *Spine , 25,* 2114-2115.

Houtman, I. L. D., Bongers, P. M., Smulders, P. G. W., & Kompier, M. A. J. (1994). Psychosocial stressors at work and musculoskeletal disease. *Scandinavian Journal of Work and Environmental Health, 20,* 139-145.

Jensen, I. B., Bergström, G., Ljungquist, T., Bodin, L., & Nygren, Å. L. (2001). A randomized controlled component analysis of a behavioral medicine rehabilitation program for chronic spinal pain: Are the effects dependent on gender? *Pain, 91,* 65-78.

Jensen, I. B., & Bodin, L. (1998). Multimodal cognitive-behavioural treatment for workers with chronic spinal pain: A matched cohort study with an 18-month follow-up. *Pain, 76,* 35-44.

Jensen, I. B., & Linton, S. J. (1993). Coping Strategies Questionnaire (CSQ): Reliability of the Swedish version of the CSQ. *Scandinavian Journal of Behaviour Therapy, 22,* 139-145.

Jensen, I. B., Nygren, Å., & Lundin, A. (1994). Cognitive-behavioural treatment for workers with chronic spinal pain: A matched and controlled cohort study in Sweden. *Occupational and Environmental Medicine, 51,* 145-151.

Jensen, M. P., & Karoly, P. (1991). Control beliefs, coping effort, and adjustment to chronic pain. *Journal of Consulting and Clinical Psychology, 59,* 431-438.

Jensen, M. P., Romano, J. M., Turner, J. A., Good, A. B., & Wald, L. H. (1999). Patient beliefs predict patient functioning: Further support for a cognitive-behavioural model of chronic pain. *Pain, 81,* 95-104.

Karasek, R. A., Schwartz, J., & Theorell, T. (1982). Job characteristics, occupation and coronary heart disease. *Final report to National Institute of Occupational Safety and Health.* New York: Columbia University.

Keefe, F.J., Caldwell, D.S., Baucom, D., Salley, A., Robinson, E., Timmons, K., Beaupre, P., Weisberg, J., & Helms, M. (1999). Spouse-assisted coping skills training in the management of knee pain in osteoarthritis: Long-term follow-up results. *Arthritis Care and Research, 12,* 101-111.

Keefe, F. J., Caldwell, D. S., Williams, D. A., Gil, K. M., Mitchell, D., Robertson, D., Martinez, S., Nunley, J., Beckham, J. C., Crisson, J. E., & Helms, M. (1990a). Pain coping skills training in the management of osteoarthritis knee pain. A comparative approach. *Behavior Therapy, 21,* 49-62.

Keefe, F. J., Caldwell, D. S., Williams, D. A., Gil, K. M., Mitchell, D., Robertson, D., Martinez, S., Nunley, J., Beckham, J. C., Crisson, J. E., & Helms, M. (1990b). Pain coping skills training in the management of osteoarthritis knee pain: II. Follow-up results. *Behavior Therapy, 21*, 435-447.

Keefe, F. J., Dunsmore, J., & Burnett, R. (1992). Behavioral and cognitive-behavioral approaches to chronic pain: Recent advances and future directions. *Journal of Clinical and Consulting Psychology, 60*, 528-536.

Keefe, F. J., & Williams, D. A. (1989). New directions in pain assessment and treatment. *Clinical Psychology Review, 9*, 549-568.

Kendall, N. A. S., & Thompson, B. F. (1998). A pilot program for dealing with the comorbidity of chronic pain and long-term unemployment. *Journal of Occupational Rehabilitation, 8,* 5-26.

Kerns, R. D., Turk, D. C., & Rudy, T. E. (1985). The West Haven-Yale multidimensional pain inventory (WHYMPI). *Pain, 23,* 345-356.

Kilbom, Å. (1994). Assessment of physical exposure in relation to work-related musculoskeletal disorders - what information can be obtained from systematic observations? *Scandinavian Journal of Work and Environmental Health, 20,* 30-45.

Klenerman, L., Slade, P. D., Stanley, I. M., Pennie, B., Reilly, J. P., Atchison, L. E., Troup, J. D., & Rose, M. J. (1995). The prediction of chronicity in patients with an acute attack of low back pain in a general practice setting. *Spine, 20,* 478-84.

Kole-Snijders, A. M. J., Vlaeyen, J. W. S., Goossens, M. E. J, Rutten-van Mölken, M. P. M., Heuts, P. H. T. G., van Breukelen, G., & van Eek, H. (1999). Chronic low-back pain: What does cognitive coping skills training add to operant behavioral treatment? Results of a randomized clinical trial. *Journal of Consulting and Clinical Psychology, 67,* 931-944.

Kotarba, J. A. (1983). *Chronic pain: Its social dimensions.* Beverly Hills: Sage.

Kugelmann, R. (1997). The psychology and management of pain: Gate control as theory and symbol. *Theory and Psychology, 7,* 43-65.

Lancourt, J., & Kettelhut, M. (1992). Predicting return to work for lower back pain patients receiving worker's compensation. *Spine, 17,* 629-40.

Lawson, K., Reesor, K. A., Keefe, F. J., & Turner, J. A. (1990). Dimensions of pain-related cognitive coping: Cross validation of the factor structure of the Coping Strategies Questionnaire. *Pain, 21,* 289-294.

Lefebvre, M. F. (1981). Cognitive distortions and cognitive errors in depressed psychiatric low back pain patients. *Journal of Consulting and Clinical Psychology, 49,* 517-525.

Lenthem, J., Slade, P. O., Troup, J. P. G., & Bentley, G. (1983). Outline of a fear-avoidance model of exaggerated pain perception. *Behaviour Research and Therapy, 21,* 401-408.

Lidwall, U. (2001). Långtidssjukskrivna: diagnos, yrke, arbetsgivare och återgång i arbete (Long-term sick-listed: diagnosis, profession, employer and return to work). *RVF (Riksförsäkringsverket) Redovisar 2001:11.*

Lindström, I., Öhlund, C., Eek, C., Wallin, L., Peterson, L. E., Fordyce, W. E., & Nachemson, A. L. (1992). The effect of graded activity on patients with subacute low back pain: A randomized prosepctive clinical study with an operant-conditioning behavioral approach. *Physical therapy, 72,* 279-90.

Linton, S. J. (1985). The relationship between activity and chronic back pain. *Pain, 21,* 289-294.

Linton, S. J. (1990). Risk factors for neck and back pain in a working population in Sweden. *Work Stress, 4,* 41-49.

Linton, S. J. (1994a). The challenge of preventing chronic musculoskeletal pain. In G. F. Gebhart, D. L. Hammond, & T. S. Jensen (Eds.), *Proceedings of the Seventh World Congress on Pain: Vol.2. Progress in pain research and management* (pp.149-166). Seattle: IASP Press.

Linton, S.J. (1994b). Chronic back pain: Activities training and physical therapy. *Behavioral Medicine, 20,* 105-111.

Linton, S. J. (1995). Strategies to enhancing occupationally-oriented rehabilitation. *Journal of Occupational Rehabilitation, 5*, 203-206.

Linton, S. J. (1998). The socioeconomic impact of chronic back pain: Is anyone benefiting? *Pain, 75,* 163-168.

Linton, S. J. (1999). Prevention with special reference to chronic musculoskeletal disorders. In R. J. Gatchel and D. C. Turk (Eds.), *Psychological factors in pain: Critical perspectives.* (pp. 374-389). New York: The Guilford Press.

Linton, S. J. (2000a). A review of psychological risk factors in back and neck pain. *Spine, 25,* 1148-56.

Linton, S. J. (2000b). Psykologiska behandlingsmetoder (Psychological interventions). In SBU – Statens beredning för medicinsk utvärdering (The Swedish Council on Technology Assessment in Health Care), *Ont i ryggen, ont i nacken (Back pain, neck pain)* (pp. 205-233). Stockholm: SB Offset AB.

Linton, S. J. (2001). Occupational psychological factors increase the risk for back pain: A systematic review. *Journal of Occupational Rehabilitation, 11,* 53-66.

Linton, S. J., & Andersson, T. (2000). Can chronic disability be prevented? A randomized trial of a cognitive-behavioral intervention and two forms of information for spinal pain patients, *Spine, 25,* 2825-31.

Linton, S. J., & Bradley, L. A. (1992). An 18-month follow-up of a secondary prevention program for back pain. Help and hindrance factors related to outcome maintenance. *Clinical Journal of Pain, 8,* 227-236.

Linton, S. J., & Bradley, L. A. (1996). Strategies for the prevention of chronic pain. In: R. J. Gatchel and D. C. Turk (Eds.), *Psychological Approaches to Pain Management: A practitioner's Handbook.* New York: Guilford Press.

Linton, S. J., Bradley, L. A., Jensen, I., Spangfort, E., & Sundell, L. (1989). The secondary prevention of low back pain: a controlled study with follow-up. *Pain, 36,* 197-207.

Linton, S. J., Buer, N., Vlaeyen, J., & Hellsing, A. L. (1999). Are fear-avoidance beliefs related to a new episode of back pain? A prospective study. *Psychology and Health, 14*, 1051-59.

Linton S. J., & Halldén, K. (1998). Can we screen for problematic back pain? A screening questionnaire for predicting outcome in acute and subacute back pain. *Clinical Journal of Pain, 14,* 209-215.

Linton S. J., Hellsing, A. L., & Halldén, K. (1998). A population-based study of spinal pain among 35-45-year-old individuals: Prevalence, sick leave, and health care use. *Spine, 23,* 1457-1463.

Linton, S. J., Melin, L., & Götestam, K. G. (1984). Behavioral analysis of chronic pain and its management. *Progressive Behavior Modification, 4,* 1-42.

Linton, S. J., & Ryberg, M. (2001). A cognitive-behavioral group intervention as prevention for neck and back pain in a non-patient population: A randomized controlled trial. *Pain, 90*, 83-90.

Litt, M. D. (1988). Self-efficacy and perceived control: Cognitive mediators of pain tolerance. *Journal of Personality and Social Psychology, 54*, 149-160.

Magora, A., & Schwartz, A. (1980). Relation between the low back pain syndrome and X-ray findings. *Scandinavian Journal of Rehabilitation Medicine, 12,* 9-15.

Martin, P. R., Nathan, P., Milech, D., & Van Keppel, M. (1989). Cognitive therapy vs. self-management training in the treatment of chronic headaches. *British Journal of Clinical Psychology, 28,* 347-361.

Melzack, R. (1999). Pain and stress: A new perspective. In R. J. Gatchel and D. C. Turk (Eds.), *Psychological factors in pain: Critical perspectives* (pp. 89-106). New York: The Guilford Press.

Melzack, R., & Casey, K. L. (1968). Sensory, motivational and central control determinants of pain: A new conceptual model. In D. Kenshalo (Ed.), *The skin senses* (pp. 423-443). Springfield: Thomas.

Melzack, R., & Wall, P. D. (1965). Pain mechanism: A new theory. *Science, 150*, 971-979.

Melzack, R., & Wall, P. D. (1982). *The challenge of pain.* New York: Basic Books.

Merskey, H., & Bogduk, N. (1994). *Classification of chronic pain: Descriptions of chronic pain syndromes and definitions of pain terms.* Seattle: IASP Press.

Montgomery, S. M., Cook, D. G., Bartley, M. J., & Wadswoth, M. E. (1999). Unemployment predates symptoms of depression and anxiety resulting in medical consultation in young men. *International Journal of Epidemiology, 28,* 95-100.

Morley, S., Eccleston, C., & Williams, A. (1999). Systematic review and meta-analysis of randomized controlled trials of cognitive behaviour therapy and behaviour therapy for chronic pain in adults excluding headache. *Pain, 80,* 1-13.

Mäkele, M., Heliövaara, M., Sievers, K., Impivaara, O., Knekt, P., & Aromaa, A. (1991). Prevalence, determinants and consequences of chronic neck pain in Finland. *American Journal of Epidemiology, 134,* 1356-67.

Nachemson, A. L. (1992). Newest knowledge of low back pain. *Clinical Orthopedics, 279,* 8-20.

Nachemson, A., & Jonsson, E. (2000). Inledning (Introduction). In SBU – Statens beredning för medicinsk utvärdering (The Swedish Council on Technology Assessment in Health Care), *Ont i ryggen, ont i nacken (Back pain, neck pain)* (pp. 33-50). Stockholm: SB Offset AB.

National Board of Occupational Safety (1999, December). *Arbetslivsfakta (Facts of Working Life).* Solna: Arbetarskyddsstyrelsen.

Newton, C. R., & Barbaree, H. E. (1987). Cognitive changes accompanying headache treatment. The use of a thought-sampling procedure. *Cognitive Therapy and Research, 11,* 635-652.

Norlund, A., & Waddell, G. (2000). Samhällets totala kostnader för ont i ryggen (The total costs of the society for back pain). In SBU – Statens beredning för medicinsk utvärdering (The Swedish Council on Technology Assessment in Health Care), *Ont i ryggen, ont i nacken (Back pain, neck pain)* (pp. 297-309). Stockholm: SB Offset AB.

Öst, L.-G. (1987). Applied relaxation: Description of a coping technique and review of controlled studies. *Behaviour Research and Therapy, 25*, 397-409.

Peters, J., Large, R. G., & Elkind, G. (1992). Follow-up results from a randomised controlled trial evaluating in- and outpatient pain management programmes. *Pain, 50,* 41-50.

Peterson, S., Eriksson, M., & Tibblin, G. (1997). Practice variation in Swedish primary care. *Scandinavian Journal of Primary Health Care, 15*, 68-75.

Philips, H. C. (1987). Avoidance behaviour and its role in sustaining chronic pain. *Behaviour Research and therapy, 25*, 273-279.

Philips, H. C., & Rachman, S. (1996). *The psychological management of chronic pain: A treatment manual*. New York: Springer Publishing Company.

Pincus, T., & Morley, S. (2001). Cognitive-processing bias in chronic pain: A review and integration. *Psychological Bulletin, 127,* 599-617.

Reid, S., Haugh, L. D., Hazard, R. G., & Tripathi, M. (1997). Occupational low back pain: Recovery curves and factors associated with disability. *Journal of Occupational Rehabilitation, 7,* 1-14.

Richardson, I. H., Richardson, P. H., Williams, A. C., Featherstone, J., & Harding, V. R. (1994). The effects of a cognitive-behavioural pain management programme on the quality of work and employment status of severely impaired chronic pain patients. *Disability and Rehabilitation, 16,* 26-34.

Riley, J. F., Ahern, D. K., & Follick, M. J. (1988). Chronic pain and functional impairment: Assessing beliefs about their relationship. *Archives of Physical Medicine Rehabilitation, 59,* 579-582.

Rosenstiel, A. K., & Keefe, F. J. (1983). The use of coping strategies in low back pain patients: Relationship to patient characteristics and current adjustment. *Pain, 17*, 33-40.

Rudy, T. E., Turk, D. C., Kubinski, J. A., & Zaki, H. S. (1995). Differential treatment responses of TMD patients as a function of psychological characteristics. *Pain, 61,* 103-112.

Rudy, T. E., Turk, D. C., Zaki, H. S., & Curtin, H. D. (1989). An empirical taxometric alternative to traditional classification of temporomandibular disorders. *Pain, 36,* 311-320.

Salén, B. A., Spangfort, E. V., Nygren, Å. L. & Nordemar, R. (1994). The Disability Rating Index: An instrument for the assessment of disability in clinical settings. *Journal of Clinical Epidemiology, 47*, 1423-1434.

Sanders, S. H. (1995). Risk factors for the occurrence of low back pain and chronic disability. *APS Bulletin,* 5, 1-5.

Sanders, S. H. (1996). Why do most patients with chronic pain not return to work? In M. J. M. Cohen and J. N. Campbell (Eds.), *Pain treatment centers at a crossroads: A practical and conceptual reappraisal* (pp. 193-201). Seattle: IASP Press.

Sandström, J., & Esbjörnsson, E. (1986). Return to work after rehabilitation: The significance of the patients´ own prediction. *Scandinavian Journal of Rehabilitation Medicine, 18,* 9-33.

Schmidt, A. J. M., Gierlings, R. E. H., & Peters, M. L. (1989). Environment and interoceptive influences on chronic low back pain behavior. *Pain, 38*, 137-143.

Seligman, M. E. P. (1995). The effectiveness of psychotherapy: The consumer reports study. *American Psychologist, 50*, 965-974.

Siegel, S. (1956). *Non-parametric statistics for the behavioral sciences.* New York: McGraw-Hill.

Skovron, M. L. (1992). Epidemiology of low back pain. *Baillière's Clinical Rheumatology, 6,* 559-573.

Smith, T. W., Aberger, E. W., Follick, M. J., & Ahern, D. L. (1986). Cognitive distortion and psychological distress in chronic low back pain. *Journal of Consulting and Clinical Psychology, 54,* 573-575.

Smith, T. W., Peck, J. R., Milano, R. A., & Ward, J. R. (1990). Helplessness and depression in rheumatoid arthritis. *Health Psychology, 9,* 377-389.

Sommerich, C. M., McGlothlin, J. D., & Marras, W. S. (1993). Occupational risk factors associated with soft tissue disorders of the shoulder: A review of recent investigations in the literature. *Ergonomics, 36,* 697-717.

Strong, J., Ashton, R., & Chant, D. (1992). The measurement of attitudes towards and beliefs about pain. *Pain, 48*, 227-236.

Sullivan, M. J. L., & D´Eon, J. L. (1990). Relation between catastrophizing and depression in chronic pain patients. *Journal of Abnormal Psychology, 99*, 260-263.

Symonds, T. L., Burton, A. K., Tillotson, K. M., & Main, C. J. (1996). Do attitudes and beliefs influence work loss due to low back trouble? *Occupational Medicine, 46,* 25-32.

Tan, V., Cheatle, M. D., Mackin, S., Moberg, P. J., & Esterhai, J. L. (1997). Goal setting as a predictor of return to work in a population of chronic musculoskeletal pain patients. *International Journal of Neuroscience, 92,* 161-170.

Thomsen, A. B., Sörensen, J., Sjögren, P., & Eriksen, J. (2001). Economic evaluation of multidisciplinary pain management in chronic pain patients: A qualitative systematic review. *Journal of Pain Symptom and Management, 22,* 688-98.

Tota-Faucette, M. E., Gil, K. M., Williams, F. J., & Goli, V. (1993). Predictors of response to pain management treatment: The role of family environment and changes in cognitive processes. *Clinical Journal of Pain, 9,* 115-123.

Turk, D.C. (1996). Biopsychosocial perspective on chronic pain. In R. J. Gatchel and D. C. Turk (Eds.), *Psychological approaches to pain management: A practitioner's handbook* (pp. 3-32). New York: The Guilford Press.

Turk, D. C. (1997). The role of demographic and psychosocial factors in the transition from acute to chronic pain. In T. S. Jensen, T. A. Turner and Z. Wiesenfeld-Hallin (Eds.), *Proceedings of the 8th World Congress on Pain, progress in pain research and management, volume 8.* Seattle: IASP Press.

Turk, D.C., & Flor, H. (1987). Pain > pain behaviors: The utility and limitations of the pain behavior construct. *Pain, 31,* 277-295.

Turk, D.C., & Flor, H. (1999). Chronic pain: A Biobehavioral perspective. In R. J. Gatchel and D. C. Turk (Eds.), *Psychological factors in pain: Critical perspectives* (pp. 18-34). New York: The Guilford Press.

Turk, D.C., Meichenbaum, D., & Genest, M. (1983). *Pain and behavioral medicine: A cognitive-behavioral perspective*. New York: The Guilford Press.

Turk, D.C., & Melzack, R. (1992). The measurement of pain and the assessment of people experiencing pain. In D. C. Turk and R. Melzack (Eds.), *Handbook of pain assessment* (pp. 3-12). New York: The Guilford Press.

Turk, D. C., Okifuji, A., & Scharff, L. (1994). Assessment of older women with chronic pain. *Journal of Women and Aging, 6,* 25-42.

Turk, D. C., Okifuji, A., & Scharff, L. (1995). Chronic pain and depression. Role of perceived impact and perceived control in different age cohorts. *Pain, 61,* 93-102.

Turk, D. C., & Rudy, T. E. (1988). Toward an empirically derived taxonomy of chronic pain patients: Integration of psychological assessment data. *Journal of Consulting and Clinical Psychology, 56,* 233-238.

Turk, D. C., & Rudy, T. E. (1990). Neglected factors in chronic pain treatment outcome studies: Referral patterns, failure to enter treatment, and attrition. *Pain, 43,* 7-25.

Turk, D. C., & Salovey, P. (1984). “Chronic pain as a variant of depressive disease”: A critical reappraisal. *Journal of Nervous and Mental Disease, 172,* 398-404.

Turner, J. A., Clancy, S., McQuade, K. J., & Cardenas, D. D. (1990). Effectiveness of behavioral therapy for chronic low back pain: a component analysis. *Journal of Consulting and Clinical Psychology, 58,* 573-79.

Turner, J. A., LeResche, L., Von Korff, M., & Ehrlich, K. (1998). Back pain in primary care. Patient characteristics, content of initial visit, and short-term outcomes. *Spine, 23,* 463-69.

van der Giezen, A. M., Bouter, L. M., & Nijhuis, F. J. N. (2000). Prediction of return to work of low back pain patients sick-listed for 3-4 months. *Pain , 87,* 285-294.

van Tulder, M., Goossens, M., Waddell, G., & Nachemson, A. (2000). Kroniska ländryggsbesvär – konservativ behandling (Chronic low back pain – conservative treatment). In SBU – Statens beredning för medicinsk utvärdering (The Swedish Council on Technology Assessment in

Health Care), *Ont i ryggen, ont i nacken (Back pain, neck pain)* (pp. 65-114). Stockholm: SB Offset AB.

van Tulder, M. W., Koes, B. W., & Bouter, L M. (1995). A cost-illness study of back pain in the Netherlands. *Pain, 62,* 233-240.

van Tulder, M. W., Koes, B. W., & Bouter, L M., Metsemakers, J. F. (1997). Management of chronic non-specific low back pain in primary care: A descriptive study. *Spine, 22,* 76-82.

van Tulder, M. W., Ostelo, R., Vlaeyen, J. W., Linton, S. J., Morley, S. J., & Assendelft, W. J. (2001). Behavioral treatment for chronic low back pain: A systematic review within the framework of the Cochrane Back Review Group. *Spine, 26,* 270-81.

van Tulder, M., & Waddell, G. (2000). Akuta ländryggsbesvär – konservativ behandling (Acute low back pain – conservative treatment). In SBU – Statens beredning för medicinsk utvärdering (The Swedish Council on Technology Assessment in Health Care), *Ont i ryggen, ont i nacken (Back pain, neck pain)* (pp. 17-64). Stockholm: SB Offset AB.

Varela-Novo, M. (1999). Unemployment and mental health in Galicia, Spain. *International Archives of Occupational and Environmental Health, 72,* 14-15.

Vendrig, A. A. (1999). Prognostic factors and treatment-related changes associated with return to work in the chronic back pain. *Journal of Behavioral Medicine, 22,* 217-232.

Vlaeyen, J., Haazen, I., Shuerman, J., Kole-Snijders, A., & Eek, H. (1995). Behavioural rehabilitation of chronic low back pain: Comparison of an operant treatment, an operant-cognitive treatment and an operant-respondent treatment. *British Journal of Clinical Psychology, 34*, 95-118.

Vlaeyen, J. W. S., Kole-Snijders, A. M. J., Boeren, R. G. B., & van Eek, H. (1995). Fear of movement/(re)injury in chronic low back pain and its relation to behavioral performance. *Pain, 62,* 363-372.

Von Korff, M. (1994). Perspectives on management of back pain in primary care. In G. F. Gebhart, D. L. Hammond, & T. S. Jensen (Eds.), *Proceedings of the Seventh World Congress on Pain: Vol.2. Progress in pain research and management* (pp. 97-110). Seattle: IASP Press.

Von Korff, M., Moore, J. E., Lorig, K., Cherkin, D. C., Saunders, K., González, V. M., Laurent, D., Rutter, C., & Comite, F. (1998). A randomized trial of a lay-led self-management group intervention for back pain patients in primary care. *Spine, 23,* 2608-2615.

Waddell, G. (1996). Low back pain: A twentieth century health care enigma. *Spine, 21,* 2820-2825.

Waddell, G. (1998). *Back pain revolution.* London: Churchill Livingstone.

Waddell, G., Alaslair Gibson, J. N., & Grant, I. C. (2000). Kirurgisk behandling av smärta i ländryggen (Surgical treatment of low back pain). In SBU – Statens beredning för medicinsk utvärdering (The Swedish Council on Technology Assessment in Health Care), *Ont i ryggen, ont i nacken (Back pain, neck pain)* (pp. 115-147). Stockholm: SB Offset AB.

Waddell, G., Feder, G., & Lewis, M. (1997). Systematic reviews of bed rest and advice to stay active for acute low back pain. *British Journal of General Practice, 47*, 647-52.

Waddell, G., & Main, C. J. (1984). Assessment of severity in low back disorders. *Spine, 9,* 204-208.

Walker, J., Holloway, I., & Soafer, B. (1999). In the system: The lived experience of chronic back pain from the perspective of those seeking help from pain clinics. *Pain, 80,* 621-628.

Wallace, M., & Buckle, P. (1987). Ergonomic aspects of neck and upper limb disorders. *International Review of Ergonomics, 1,* 173-200.

Wändell, P. E., Brorsson, B., & Åberg, H. (1997). Psychic and socioeconomic consequences with diabetes compared to other chronic conditions. *Scandinavian Journal of Social Medicine, 25,* 39-43.

Wewers, M. E., & Lowe, N. K. (1990). A critical review of visual analogue scales in the measurement of clinical phenomena. *Research in Nursing and Health, 13,* 227-236.

Williams, A. C., Richardson, P. H., Nicholas, M. K., Pither, C. E., Harding, V. R., Ridout, K. L., Ralphs, J. A., Richardson, I. H., Justins, D. M., & Chamberlain, J. H. (1996). Inpatient vs. outpatient pain management: Results of a randomized controlled trial. *Pain, 66,* 13-22.

Williams, D. A., Robinson, M. E., & Geisser, M. E. (1994). Pain beliefs: Assessment and utility. *Pain, 59*, 71-78.

World Health Organization. (1992). *International Statistical Classification of Diseases and Related Health Problems* (10^{th} rev.). Geneva: WHO.

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