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The Efficacy of Comprehensive Behavior Therapy for Chronic Pain

Debbie Anne Sookman

A Thesis

in

The Department

of

Psychology

Presented in Partial Fulfillment of the Requirements
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ABSTRACT

The Efficacy of Comprehensive Behavior Therapy for Chronic Pain

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Concordia University, 1987

Chronic non-malignant pain is highly prevalent, costly in its disabling effects, and difficult to treat. Medical interventions often do not ameliorate the pain symptoms of chronic pain patients. Severe psychosocial dysfunction, psychopathology, excess pain behavior, and marital difficulties are frequent concomitants, indicating the need for psychological treatment of chronic pain. This study evaluated the efficacy of comprehensive behavior therapy as a treatment for chronic pain; examined the influence of hospitalization on treatment; assessed and treated spouses; and utilized several parameters of change. Forty-one chronic pain patients were matched and randomly assigned to inpatient behavior therapy, outpatient behavior therapy, or to a wait-list control condition. Treatment consisted of 18 sessions of operant and cognitive behavior therapy given on a small group basis, followed by relapse prevention training. The results replicated and extended previous evidence that behavior therapy ameliorates pain symptoms of chronic pain patients who do not benefit from medical treatment. There was a more consistent positive treatment effect across measures of change for inpatients than for outpatients. A reliable positive treatment effect over time was evidenced by inpatients relative to controls on the Pain Rating Index and Present Pain Intensity of the McGill Pain Questionnaire, on record keeping of pain symptoms at home (Pain Record), on Analgesic Medication Intake for pain, and on spousal ratings of activity level and

pain behavior. These improvements were maintained at three month follow-up. Outpatients showed reliable improvement over time only on the Pain Rating Index, and were improved relative to controls only on three measures: The Pain Rating Index, Pain Record, and Analgesic Medication Intake. Outpatient improvement in medication consumption was not maintained four weeks after intensive treatment. These results provide support for the hypothesis that hospitalization assures a more reliable and enduring positive outcome for behaviorally treated pain patients than does outpatient intervention. More research is needed to clarify further the influence of the treatment milieu on the effectiveness of comprehensive behavior therapy. The efficacy of "significant others" as agents of therapeutic change also merits further study.

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Pain has been defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage" (Hoon, Feuerstein & Papciak, 1985, p. 379). Acute pain serves an adaptive function by alerting the organism to the presence of illness (Aronoff, 1985). In its chronic benign (non-malignant) form, however, pain no longer serves an adaptive function, but is a "malefic force that imposes severe emotional, physical, economic and social stresses on the patient, on the family, and on the society" (Bonica, 1980, p. 4). Pain is usually defined as chronic when it persists longer than six months and does not respond to conventional medical and/or surgical management (Crue, 1985).

Chronic pain is highly prevalent, costly in its disabling effects, and difficult to treat. In the United States it is estimated that 15 million people suffer from low back pain; seven million of these are reported to be disabled (Clark, Gosnell & Shapiro, 1977). Twenty-five million individuals suffer from chronic headaches (Paulley & Haskell, 1975). An estimated 700 million work days per year are lost because of chronic pain-related disability, and the total cost of lost production, medication, hospitalization, and professional fees amounts to an estimated 60 billion dollars per year (Bonica, 1980). The enormity of the emotional suffering of the chronic pain patient and his/her family is documented in numerous studies which have examined psychosocial concomitants of the disorder.

Many chronic pain patients who do not respond to medical or surgical treatment are multi-symptomatic and severely disabled. The following symptoms in addition to pain have been reported to be commonly manifested by these patients: anxiety (Reich, Rosenblatt, & Tupin, 1983; Krishnan

et al., 1985); depression and suicidal ideation (Romano & Turner, 1985; Roy, 1986); severe sleep disturbance (Blumer, Heilbronn & Roth, 1982); hypochondriasis, somatic preoccupation, and certainty about the presence of disease pathology (Pilowsky & Spence, 1975, 1976; Love & Peck, 1987); severe disability which may include many hours daily spent in bed, abandonment of family responsibilities (Fordyce, 1976), and frequent inability to work (Herman & Baptiste, 1981); abuse of analgesic and narcotic medication often to be point of addiction (Buckley, Sizemore & Charlton, 1986); a pattern of communication to significant others and health-care professionals predominated by verbal and behavioral expressions of pain (e.g., limping, groaning, complaining) (Keefe & Block, 1982; Anderson & Rehm, 1984; Turk, Wack & Kerns, 1985; Keefe, Crisson, Maltbie, Bradley & Gil, 1986; Lichtenberg, Swensen & Skehan, 1986); social withdrawal (Fordyce, 1976); and marital and sexual difficulties (Maruta & Osborne, 1978; Payne & Norfleet, 1986). Several studies have indicated that these symptoms are often greatly disproportionate to the identifiable physical illness (Swanson & Maruta, 1980; Skevington, 1983; Naliboff, Cohen, Swanson, Bonebakker & MacArthur, 1985; Lichtenberg, et al., 1986).

As Fordyce et al., (1973) have noted, traditional methods of pain treatment are based on the assumption that pain results from an underlying pathological condition. According to this view, removal or amelioration of the tissue damage factor should lead to a reduction in pain and disability. Numerous studies, however, have indicated that this is often not the case. Traditional single treatment methods such as neurosurgery, nerve blocks, transcutaneous nerve stimulation, and

physiotherapy are not effective in reducing reported pain and disability in a substantial number of pain patients (Long & Hagfors, 1975; Nachemson, 1979; Loeser, 1980; Magora & Schwartz, 1980; Long, 1982; Bouras, Bartlett, Neil-Dwyer & Bridges, 1984).

Recent theoretical formulations on chronic pain place increasing emphasis on the interplay between the "psyche" and the "soma." Keel (1984) expresses the current consensus among investigators when he states: "The dichotomy of organic versus psychogenic pain must be dismissed, and a holistic interactive systems model must be advocated" (p. 935). The well known "gate-control theory" proposed by Melzack and Wall (1965) exemplifies this view of chronic pain. These authors argue that the experience of pain is multi-determined, and consists of the following three components: (a) sensory-discriminative; (b) motivational-affective; and (c) cognitive-evaluative. According to this theory, somatic input and pain perception are subject to the modulating influences of cognitive, affective, and behavioral factors. Other recent models of chronic pain also postulate an interplay between psychological and physiological factors (Fordyce, 1976; Flor, Turk & Birbaumer, 1985; Turk & Flor, 1984). The results obtained in many well-controlled studies support this view (see below).

Recognition of the complexity of the disorder and its resistance to treatment has led to the development of multi-disciplinary treatment centres which utilize psychological modalities of treatment. Patients accepted for psychological treatment have received medical treatment and/or surgery. Most have had a history of numerous previous unsuccessful medical treatments (Fordyce, 1976). Despite the successful

utilization of behaviour therapy for a wide range of psychiatric disorders (O'Leary & Wilson, 1987), there is a relative paucity of well-controlled studies testing its efficacy as a treatment for chronic pain. The four main behavioral approaches used in the treatment of chronic pain are: (a) biofeedback (Pelletier & Peper, 1977); (b) relaxation training (Bernstein & Borkovec, 1973); (c) operant conditioning (Fordyce et al., 1973; Fordyce, 1976); and (d) cognitive behavior therapy (Meichenbaum & Turk, 1976; Turk, Meichenbaum & Genest, 1983; Meichenbaum, 1985).

Biofeedback

Biofeedback consists of feedback of electronically monitored events along several possible dimensions (electroencephalogram, skin temperature, cephalic blood volume, or electromyographic feedback) the aim of which is to produce a state hypothesized to be incompatible with pain. There is evidence that during activity and discussion of personally relevant stress low back pain patients, unlike control subjects, exhibit a significant increase in paraspinal muscle tension (De Vries, 1968; Nouwen & Bush, 1984; Flor, et al., 1985). Most controlled studies of biofeedback treatment have been restricted to the alleviation of headache or temporomandibular joint pain (Chapman, 1986). These studies have been summarized by several reviewers (Turner & Chapman, 1982; Holmes & Burish, 1983; Chapman, 1986). Conclusions of these reviews may be summarized as follows: (a) Biofeedback is significantly more effective than pseudofeedback and/or no-treatment control groups in reducing tension and migraine headache frequency; (b) biofeedback is no more effective than relaxation; and (c) evidence for the operation of mechanisms assumed to underlie biofeedback (e.g., specific contribution

of frontalis EMG to muscle contraction headaches and of thermal parameters to migraines) is equivocal (Chapman, 1986). The efficacy of biofeedback as a treatment for other types of chronic pain has not been demonstrated (Chapman, 1986). Biofeedback was therefore not included in the treatment package used in the present study.

Relaxation Training

Progressive muscle relaxation training is a widely used technique which is included in most cognitive behavioral treatment programs for chronic pain. As Kerns, Turk & Holzman (1983) have noted, the technique is used to relax muscles implicated in musculoskeletal pain; to reduce anxiety associated with pain; and to provide a coping strategy for pain and stress. Most variations of the technique involve tensing and relaxing major muscle groups throughout the body. In the final stages of practice the patient may be taught to relax in a variety of situations using self-instructional cues and/or imagery (Bernstein & Borkovec, 1973). Numerous well-controlled studies of patients who suffer from tension and migraine headaches have demonstrated significant reductions in headache frequency and intensity as a result of relaxation therapy (see review by Chapman, 1986). There is also evidence that relaxation training reduces low back pain (Turner, 1982; Linton & Melin, 1983; Linton & Gotestam, 1984; Linton, Melin & Stjernlof, 1985). However, studies have shown that relaxation training is less effective as a treatment for headache and low back pain than cognitive pain coping strategies (Holroyd, Andrasik & Westbrook, 1977; Mitchell & White, 1977; Turner, 1982). Relaxation training does not reliably reduce pain-related symptoms such as inactivity and medication intake (Linton & Gotestam,

1984). Although relaxation training is not by itself an adequate treatment for chronic pain, the available literature supports its inclusion as one component in a comprehensive behavior therapy program for chronic pain. This technique was therefore included in the treatment package used in the present study.

Operant Behavior Therapy

Operant therapy is the most frequently reported behavior therapy approach for chronic pain-related disability (Fordyce, et al., 1973; Fordyce, 1976). This approach is based on the notion that "respondent pain behavior", or reflexive responses to noxious internal stimuli, can become "operant" through the influence of environmental consequences which become contingent upon it. According to Fordyce (1976), behavior may become operant if reinforced and maintained by positive environmental consequences such as attention from doctors and significant others, time-out from unpleasant or stressful situations, financial compensation, etc. Thus, pain behavior could occur independently of nociceptive stimuli and would not necessarily decrease with an amelioration in the patient's physical condition. Fordyce (1976) has defined pain behavior as: (a) verbal complaints of pain and suffering; (b) non-verbal communication (e.g., sighs, moans); (c) posturing and gesturing (e.g., grimacing, limping, rubbing the painful body part); and (d) displays of functional impairment (e.g., excessive bed rest). Two studies (Keefe & Block, 1982; Turk, Wack & Kerns, 1985) have demonstrated that operationally defined pain behaviors can be identified with a high level of inter-rater reliability (percentage agreement across items ranged from 93% to 99%).

Several components of traditional pain management are considered by

the operant approach to reinforce pain behavior. Analgesic medication, for example, is often prescribed on an as-needed basis. As a result, temporary relief of distress is made contingent on the occurrence of pain or signals of distress. This can reinforce the medication intake and pain behavior cycle. Addiction to narcotics is common (Maruta, Swanson & Swenson, 1979; Ready, Sarkis & Turner, 1982; Buckley et al., 1986). A second factor which may reinforce pain behavior is bed rest, which is usually prescribed also on an as needed basis. However, rest may have the reinforcing property of "time-out" from unpleasant responsibilities. Inactivity can reduce a variety of reinforcers available to the patient and can have a direct physiological effect on the patient's ability to perform normally (Fordyce, 1976). Clinical depression with progressive decreases in socialization, exercise, and productive activity are the frequent result (Fordyce, 1976). Many chronic pain patients report a gradual increase in time spent in bed, up to many hours daily, despite stabilization of their pain condition (Bonica, 1985).

Several authors (Fordyce, 1976; Roy, 1982; Payne & Norfleet, 1986) have emphasized the importance of the spouse as a reinforcer of illness behavior. Block, Kremer & Gaylor, (1980) found that chronic pain patients with solicitous spouses (i.e., spouses who reinforced pain behavior at home) reported more pain when they were interviewed in the presence of their spouse than when they were interviewed in the presence of a ward clerk. This was not the case for patients whose spouses were not solicitous of pain behavior. There is evidence that spouses who report feeling distressed by their partner's pain behavior perceive the pain to be more intense and manifest more solicitous behaviour than low

distress spouses (Rowat & Knafl, 1985). Many spouses of highly symptomatic pain patients report high levels of psychological distress on standardized measures of psychopathology (Shanfield, Heiman, Cope & Jones, 1979; Roberts & Reinhardt, 1980; Block & Boyer, 1984; Rowat & Knafl, 1985).

Given the above findings, operant behavior therapy appears to be particularly suitable as a treatment for chronic pain. Its main goals in the treatment of chronic pain are: (a) to reduce pain behavior; (b) to reduce excessive medication intake and health care utilization; (c) to increase activity; (d) to rearrange the contingencies of pain and well behavior by the patient's significant others; and (e) to establish and maintain well behavior (Fordyce, 1976). As mentioned earlier, Fordyce (1976) has argued that effective operant therapy for many patients with chronic pain requires hospitalization. Although this assumption has not been tested, operant therapy is usually administered in a well-controlled hospital setting (Keefe, Gil & Rose, 1986). In this milieu, activity and medication intake are changed from a pain-contingent to a time-contingent schedule. Rest is scheduled as a reinforcer to activity. Analgesic medication intake is gradually decreased, and activity is gradually increased. Pain behavior and failure to adhere to requirements of the program are met with neutral non-attention. Fordyce (1976) has recommended that spouses be taught to identify the patient's pain-related and well behavior and to apply operant principles to decrease illness behavior and to increase well behavior.

There are numerous reports of operant therapy used with hospitalized chronic pain patients, but relatively few of these are controlled

(Linton, 1986; Keefe et al., 1986). The efficacy of operant therapy has been examined as a treatment for inactivity and medication intake. Controlled studies have shown that operant therapy reduced bed rest and medication intake and increased activity as compared with relaxation, feedback, and/or no-treatment conditions (Cairns & Pasino, 1977; Sanders, 1983; Linton & Gotestam, 1984). Improvement resulting from operant therapy was maintained at six to 12 month follow-up (Linton & Gotestam, 1984). These findings support the inclusion of operant therapy in comprehensive behavior therapy for pain-related functional disability and medication intake. Operant therapy was therefore included in the treatment package used in the present study.

Several treatment issues raised by the operant approach have not been investigated. The question of hospitalization (Fordyce, 1976) has not been examined. Despite evidence that many spouses are distressed by their partner's pain behavior and reinforce it (Block et al., 1980; Rowat & Knafl, 1985), studies of operant therapy for chronic pain have not included the spouse. Moore & Chaney (1985) reported the only study in which chronic pain patients came to treatment accompanied by their spouse. This study showed that limited spousal involvement which consisted mainly of observing cognitive behavior therapy designed for the patient did not influence the patient's response to treatment. Two studies have assessed spousal perceptions of the patient's psychosocial functioning before and after cognitive behavior therapy (Turner, 1982; Moore & Chaney, 1985). However, the spousal measure used in these studies was not standardized (Turner, 1982) and was not comparable to the measure completed by the patient (Moore & Chaney, 1985). Although

operant therapy is designed to reduce pain behavior, change in patients' pain behavior at home has not been examined. Finally, studies have shown that operant therapy by itself is not an adequate treatment for chronic pain. Operant therapy does not reliably reduce pain (Sanders, 1983; Linton & Gotestam, 1984). The operant approach does not address cognitive and emotional factors which have been shown to influence pain perception and tolerance.

Cognitive Behavior Therapy

Cognitive behavior therapy for chronic pain represents the most comprehensive treatment approach to the disorder. Emphasis in assessment and treatment is placed on what the patient thinks and feels about pain and stress as well as on behavioral coping. According to cognitive theorists, an individual's processing of stimuli mediates the perception of noxious events and subsequent responses (Goldfried, 1977; Mahoney, 1974; Meichenbaum, 1977). In the treatment of pain, cognitive-behavioral strategies "may mediate pain by altering individuals' appraisals of the threat, their ability to control the quality of noxious sensations, and their emotional arousal" (Turk et al., 1983, p. 81). There is a growing body of research which supports this view.

Rosenstiel & Keefe (1983) showed that patients' cognitive responses to pain (e.g., coping self-statements, attention-diversion strategies, a tendency to catastrophize) accounted for a significant amount of variance in pain intensity, disability, anxiety, and depression. Patients who scored high on items describing a tendency to somatize, to catastrophize, and to attribute control to external sources (e.g., praying) reported significantly more disability and higher levels of pain than patients who

scored low on these items. Smith, Aberger, Follick & Ahern (1986) also reported similar findings. There is evidence that chronic pain patients have difficulty coping with stress and that this difficulty is related to their experience with pain. Feuerstein, Sult & Houle, (1985) found that chronic pain patients reported significantly higher levels of general life and family stress than well-matched normal controls. Environmental stressors reported by the pain group were more frequently associated with anxiety and depression than was the case for the control group. In addition, specific stressors such as family conflict and difficulties at work were associated with high affective and evaluative pain ratings on the McGill Pain Questionnaire (Melzack, 1975). These findings indicate the relevance of addressing the patient's cognitive responses to pain and of behavioral interventions for pain patients which are "stress-directed" as well as "pain-directed" (Pearce, 1983).

Cognitive behavioral techniques have been successfully utilised for a variety of disorders, e.g., phobic and anxiety disorders (Meichenbaum, 1977; Meichenbaum & Jaremko, 1982); psychosomatic illness (Meichenbaum & Turk, 1982); and depression (Beck, Rush, Shaw & Emery, 1979), but have been relatively under-utilised for the treatment of chronic pain (Turk et al., 1983). Several cognitive coping techniques have been developed for the treatment of pain. These include: (a) somatization, or focusing on bodily sensations (Evans & Paul, 1970); (b) imaginative inattention, or focusing away from the pain (Chaves & Barber, 1974); (c) imaginative transformation of pain, or transforming and re-interpreting the sensations as something other than pain (Neufeld, 1970); (d) imaginative transformation of context, for example, imagining one is a spy shot in

the arm (Knox, 1973); and (e) stress inoculation (Meichenbaum & Turk, 1976). Stress inoculation is the most extensively examined multi-dimensional cognitive behavioral approach (Horan, Hackett, Buchanan, Stone & Demchik-Stone, 1977; Meichenbaum & Turk, 1976; Turk, 1978; Hackett, Horan, Buchanan & Zumoff, 1979). Stress inoculation encompasses diverse techniques and consists of five phases: (a) education; (b) preparation for pain; (c) confrontation and handling of pain; (d) coping with associated feelings; and (e) self-reinforcement (Meichenbaum, 1977).

In the educational phase patients are provided with a conceptualization of pain which includes a description of Melzack & Wall's (1965) gate control theory. Emphasis is placed on the contribution of cognitive and affective factors to the experience of pain and on the importance to pain reduction of learning to control these. The role of anticipatory anxiety, muscle tension, and feelings of helplessness in exacerbating pain are discussed and illustrated. Pain reduction strategies that the patient has used are identified, and more effective strategies (including the cognitive strategies listed above) are taught and practised. An individually tailored coping package is developed for each patient.

Techniques used in the remainder of the program include relaxation, self-instructional training, imaginal rehearsal of strategies, and practice with real life stressors. In imaginal rehearsal the patient is asked to include images of faltering and experiences of anxiety and helplessness as well as pain, and to cope with these. Self-instructions (e.g., "I can cope with this. Now what shall I do?") are used to shift

attentional focus and to influence the patient's interpretation and experience of his physiological state. Modeling of coping responses by the therapist and role playing are also used. Problem solving training to increase behavioral coping skills for pain and for stress may also be included (Meichenbaum, 1985)..

Most of the controlled studies on the efficacy of cognitive techniques in alleviating pain have been carried out with medical patients about to undergo noxious medical procedures or surgery and with normal subjects exposed to experimentally induced pain (Turk et al., 1983). Several studies have shown that medical patients who were taught cognitive coping and relaxation induction for use during a noxious medical procedure reported and showed significantly less anxiety than patients who received procedural information, attention placebo, or no-intervention (Johnson, 1973; Johnson & Leventhal, 1974; Wernick, Jaremko & Taylor, 1981). It has also been found that patients who received training to use cognitive coping strategies prior to surgery reported and showed significantly less pre- and post-operative anxiety, requested less analgesic medication, and went home sooner than matched patients who did not receive this training (Langer, Janis & Wolfer, 1975; Fortin & Kirouac, 1976; Wells, Howard, Nowlin & Vargas, 1986). Pain has been experimentally induced by means of pressure (Scott & Barber, 1977), cold (Lovallo, 1975), and muscle ischemia (Smith, Egbert, Markowitz, Mosteller & Beecher, 1966). Numerous studies of experimentally induced pain have demonstrated the efficacy of individual cognitive strategies in increasing pain threshold and/or tolerance (see review by Turk et al., 1983)

Relatively few studies have examined the efficacy of a cognitive behavioral approach for chronic pain (Holroyd, et al., 1977; Mitchell & White, 1977; Holroyd and Andrasik, 1978; Rybstein-Blinchik, 1979; Figueroa, 1982; Turner, 1982; Engstrom, 1983; Moore & Chaney, 1985). Most of these studies reported training patients to use one or more cognitive strategies or stress inoculation to cope with pain (Holroyd et al., 1977; Mitchell & White 1977; Rybstein-Blinchik, 1979; Turner, 1982). Two studies used a more comprehensive cognitive-behavioral treatment package (i.e., relaxation, practice with a variety of cognitive strategies, problem solving, and assertive training) (Figueroa, 1982; Moore & Chaney, 1985). These studies showed that cognitive/behavioral techniques significantly reduced pain and psychosocial dysfunction compared with traditional psychotherapy, relaxation, self-monitoring, and/or no-treatment conditions. Significant reduction of anxiety, disability, and staff-observed pain behavior was also reported (Rybstein-Blinchik, 1979; Figueroa, 1982; Turner, 1982). Improvements were maintained at one to three month follow-up (Holroyd et al., 1977; Turner, 1982; Moore & Chaney, 1985). These findings strongly indicate that cognitive and behavioral techniques should be included in a behavior therapy package for chronic pain. They were therefore included in the treatment package used in the present study.

A methodological flaw in the foregoing studies was their failure to include dependent measures which assess central pain-related symptomatology. For example, although 30% of patients in the study of Moore & Chaney (1985) were taking narcotic medication, medication intake was not included as a dependent measure. The authors reported that most

of the patients who took narcotics before treatment continued to do so after treatment. This finding suggests that both operant and cognitive behavioral interventions are required to provide adequate treatment for many chronic pain patients. In view of the complexity of chronic pain, evaluation of treatment effect should be multi-dimensional (Genest & Turk, 1979).

In summary, chronic pain patients are often severely disabled and multi-symptomatic individuals with a long history of unsuccessful medical treatment. The research findings to date argue for the concurrent use of operant and cognitive behavior therapy in a comprehensive treatment package whose aims include a decrease in functional disability and medication intake as well as amelioration of cognitive and emotional factors associated with the pain experience. However, controlled research has not been carried out to examine the efficacy of comprehensive behavior therapy that includes a full complement of operant and cognitive behavioral techniques. In view of the enormous emotional and financial costs of chronic pain, the question of what will serve as the optimal treatment milieu is central. It has been argued (Fordyce, 1976) that for many cases of chronic pain hospitalization provides the optimal environment for operant therapy designed to decrease pain behavior, disability, and medication intake. However, the efficacy of inpatient treatment as compared to that of outpatient treatment has not been investigated. The finding that many spouses report pain-related distress and reinforce pain behavior indicates that spouses should be included as active participants in behavior therapy for chronic pain. This has not been done in previous studies. Change in spousal

psychopathology as a result of treatment has not been examined, nor have treatment-related changes in spousal perceptions of the patient been adequately assessed. Finally, in an attempt to address the complexity of chronic pain, recent well-controlled studies have utilized multi-dimensional assessment (Turner, 1982; Moore & Chaney, 1985). However, these studies failed to assess central chronic pain symptoms such as the affective and evaluative aspects of pain (Melzack, 1975), medication intake, psychopathology, and pain behavior at home.

The present study was prompted by the need for empirical investigation of these questions.

Aims and Hypotheses

1. The first aim of the study was to examine the efficacy of comprehensive behavior therapy as a treatment for chronic pain, using multi-dimensional assessment of change. It was expected that chronic pain patients who receive this treatment would report significant improvement in their pain symptoms, activity level, and psychopathology. Because the treatment package used in this study includes relapse prevention training (Meichenbaum, 1985), it was expected that improvement as a result of treatment would be maintained at three-month follow-up.
2. The second aim of the study was to determine the efficacy of inpatient versus outpatient comprehensive behavior therapy for chronic pain. It was hypothesized that individuals receiving behavior therapy as inpatients would show significantly more improvement than individuals receiving behavior therapy as outpatients as manifested by (a) a reduction in frequency of pain-

related behavior; (b) an increase in level of activity; (c) a reduction in amount of medication consumed; and (d) an increase in range of motion. These are the key target behaviors associated with pain that are addressed by operant therapy. Control of external contingencies of pain and well behavior and supervision of medication intake and activity begins immediately on admission to hospital for inpatients and is administered by trained personnel. Consistency of appropriate reinforcement, therefore, would be expected to be greater in a well-controlled hospital setting. Appropriate contingencies of the patient's behavior at home would be expected to the extent that spouses can learn to apply them. Since patients were expected to maintain their improvement at three month follow-up, it was predicted that differences in improvement between inpatients and outpatients immediately following treatment would be maintained at follow-up.

3. The third aim of the study was to assess changes in spousal psychopathology as a function of treatment. It was hypothesized that spouses of treated patients would report that their own psychological functioning had improved. This was expected for two reasons. First, studies have indicated that spousal psychopathology is in part a stress response to the patient's chronic pain symptoms (Rowat & Knafl, 1985). Therefore, improvement in the patient's symptomatology should lead to a reduction in spousal psychopathology. Second, in the present study, spouses attended weekly group therapy sessions where they were taught the adaptive responses needed to cope more effectively with their partner's

symptomatology. The aim of these sessions was to reduce feelings of helplessness, anxiety, and depression. If effective, the group therapy was expected to reduce spousal psychopathology. It was further hypothesized that spouses of inpatients would report significantly less psychopathology after treatment than spouses of outpatients. Since inpatients were expected to improve significantly more than outpatients, spouses of inpatients were also expected to experience less stress than spouses of outpatients and as a result less psychopathology.

4. The fourth aim of the study was to assess changes in spousal perceptions of the patient's pain behavior and activity. It was expected that the pattern of improvement predicted for patients would be reflected in independent spousal ratings of patients. Specifically, it was hypothesized that (a) spouses would report significantly less pain behavior and significantly more activity for treated patients than would spouses of control patients; and (b) spouses would report significantly more improvement for inpatients with regard to pain behavior and activity than would spouses of outpatients.

Method

Subjects

The sample consisted of 41 chronic pain patients and their spouses. To be included in the study, the patient (a) had to have had a primary presenting complaint of non-malignant (benign) pain of at least six months' duration which had failed to improve following appropriate medical treatment; (b) had to have significant disability due to pain, defined as a minimum of 10% of the patient's daily waking time in pain-related behavior, e.g., bed rest; (c) was between the age of 20 to 65 years; (d) had a minimum of eight years of education; (e) could communicate in English; and (f) was married. Candidates were excluded (a) if they reported episodic pain (i.e., a pain-free period which exceeded one day during the six months prior to assessment); (b) if medical investigation had not been complete; (c) if additional medical treatment or surgery was recommended at the time of assessment; (d) if a progressive neurological or other disease process was responsible for the pain; and (e) if there was a primary diagnosis of psychiatric illness or organic brain syndrome.

Forty-six patients met the selection criteria and had suitable matching characteristics. Selected patients were matched as closely as possible on age, sex, education, socioeconomic status, location and duration of pain, previous surgery, and financial compensation for pain. They were randomly assigned to the inpatient, outpatient, or wait-list control groups. Random assignment conditions, however, could not be rigorously observed in the final stage of data collection (see Procedure, p. 37). In order to improve the match for females across the groups,

four females who met the selection criteria were added to the outpatient group. Four of the selected patients dropped out during the study. One patient was disqualified after the study began when additional information indicated that she had not met the selection criteria. The final sample therefore consisted of 41 patients: five men and seven women for a total of 12 in the inpatient group; five men and 12 women for a total of 17 in the outpatient group; and five men and seven women for a total of 12 in the wait-list control group.

The sample's characteristics are presented by group in Tables 1 and 2. A two-way (Group x Sex) Analysis of Variance (ANOVA) to test for group differences at pre-treatment on the sample characteristics was performed on each of the following variables: (a) age; (b) age of onset of illness; (c) duration of illness; (d) number of previous surgeries; (e) years of education; and (f) socioeconomic index (Blishen and McRoberts, 1976). All analyses showed a non-significant main effect for Group and for Sex and a non-significant Group x Sex interaction (see Appendix I for ANOVA Summary Tables). Chi-square analyses were performed to determine differences by group, and by group and sex in (a) previous surgery; (b) location of pain; and (c) occupational status. The Chi-square analyses were all non-significant. Thus, there were no significant differences between inpatients, outpatients, and controls at pre-treatment on the sample characteristics.

On the average, study patients had suffered from pain for over a decade. Ten patients underwent surgery without sustained pain relief. The location of pain reported by patients was mixed and included pain in

Table 1

Means (and Standard Deviations) for Sample Characteristics

Variable	Group		
	Inpatient (N=12)	Outpatient (N=17)	Control (N=12)
Age	45.67(10.07)	45.29(9.85)	44.92(9.00)
Age of Onset of Illness	33.08(9.49)	33.59(8.70)	33.33(9.82)
Duration of Illness	12.58(9.12)	11.71(6.80)	11.58(6.97)
Mean No. of Surgeries	1.67(0.58)	1.50(0.58)	1.67(0.58)
Years of Education	10.00(1.76)	10.65(1.46)	10.75(1.96)
Socioeconomic Index	55.55(10.82)	56.13(13.13)	54.82(14.24)

Table 2

Location (and Diagnosis) of Pain by Group

Pain Category	Group		
Number of Patients With:	Inpatient (N=12)	Outpatient (N=17)	Control (N=12)
1. Low Back Pain (Accident Precipitated Herniated Disc-Surgically Treated)	3	4	3
2. Low Back Pain (Lumbar Disc Disease and/or Arthritis-no Surgery)	3	5	3
3. Upper Back and Neck Pain (Cervical Disc Disease)	2	3	2
4. Temporomandibular Joint Pain (Arthritis)	1	1	1
5. Headache (Combination Tension/Migraine)	3	4	3

the lower back, upper back and neck, temporomandibular joint, and head areas. Occupational status of the sample before treatment was as follows: Ten men worked full time; three (one in each group) were on leave of absence from work and were receiving financial compensation; two (one inpatient and one control) had taken early retirement due to pain. Six women worked outside the home and twenty were full-time housewives. Three women (one in each group) had stopped working because of pain.

Dependent Measures

The patient and spousal measures are listed in Table 3. Copies of the measures are found in Appendices A to F.

McGill Pain Questionnaire (MPQ, Melzack, 1975). The MPQ is the instrument most widely used to assess chronic pain. It is a self-report measure designed to measure sensory (e.g., spatial, thermal), affective (e.g., tension, fear), and evaluative (intensity) aspects of pain. The questionnaire yields a Pain Rating Index (PRI) and a rating of Present Pain Intensity (PPI). The PRI represents the patient's sensory, affective, and evaluative ratings of pain. The score is based on the sum of numerical values assigned to each word descriptor selected by the patient (e.g., "throbbing", "wretched", "unbearable", etc.) for a maximum total score of 78. The PPI represents the patient's rating of present pain intensity on a 0 - 5 point scale anchored by word descriptors of increasing intensity, where 0 = no pain and 5 = excruciating. The MPQ's high internal consistency (r = .84 - .97), retest reliability (average consistency across testings was 70.3%), and sensitivity to change have been demonstrated (Melzack, 1975; Melzack & Perry, 1975; Agnew & Merskey, 1976; Bakal & Kaganov, 1976; Dubuisson & Melzack, 1976).

Table 3

Dependent Measures

Patients	Instrument
1. Pain Intensity (PPI)	McGill Pain Questionnaire
2. Evaluation of Pain (PRI)	McGill Pain Questionnaire
3. Pain Intensity, Pain Talk, and Interference Due to Pain At Home	Pain Record
4. Analgesic Medication Intake	Pain Record
5. Range of Motion	Physiotherapy Assessment
6. Socially Expected Activities	Katz Performance Scale
7. Free-Time Activities	Katz Frequency Scale
8. Psychopathology	Hopkins Symptom Checklist

Spouses	Instrument
1. Psychopathology - Self Report	Hopkins Symptom Checklist
2. Spouse Ratings of the Patient	
a) Socially Expected Activities	Katz Performance Scale
b) Free-Time Activities	Katz Frequency Scale
c) Pain Behavior at Home	Pain Record

Hopkins Symptom Checklist (HSCL, Derogatis, Lipman, Rickels, Uhlenhuth & Covi, 1974). The HSCL is a 58-item self-report questionnaire designed to measure the presence and intensity of neurotic and somatic symptomatology. It provides a score on a 1 - 4 point scale for: (a) somatization; (b) obsessive-compulsive symptoms; (c) interpersonal sensitivity; (d) depression; (e) anxiety; and (f) total intensity (maximum total score = 232). The test has been used extensively in psychotherapy and pharmacotherapy outcome studies (Uhlenhuth, et al., 1966; Luborsky & McLellan, 1981; Barrett & Hearst, 1982). The HSCL has been shown to have good internal consistency (r = .84 - .87), retest reliability (r = .75 - .85), concurrent validity (70% agreement between clinician and psychometric ratings), and factorial invariance (r = .65 - .96) (Derogatis, Lipman, Covi, Rickels & Uhlenhuth, 1970; Derogatis, Lipman, Covi, & Rickels, 1971, 1972; Derogatis et al., 1974, Rickels, Lipman, Garcia & Fisher, 1972). The HSCL has also been found to be sensitive to changes following somatic and psychotherapeutic treatments (Friedman, Cowitz, Dohen & Granick, 1963; Lipman, Park & Rickels, 1965; Lipman, Rickels, Covi, Derogatis & Uhlenhuth, 1969; Uhlenhuth, 1975). Because sample size constraints limited the number of dependent variables that could be employed, only the total intensity score which represents the sum of all test items was used in this study.

Katz Social Adjustment Scales (KAS, Katz & Lyerly, 1963). This measure consists of eight scales which assess symptomatic behavior and psychosocial functioning of the patient. Two of the scales considered relevant for use in the present study measure performance of socially expected activities and frequency of free-time activities. For purposes

of clarity these scales were labelled Performance Scale and Frequency Scale, respectively in the present study. The Performance Scale consists of a list of 16 activities which ~~include items describ~~ing family and social responsibilities, social and community activities, self-care behavior, and home adjustment. The items are rated on a three point scale (am not doing it, am doing some, am doing regularly) and are summed for a total score (maximum = 48). The Frequency Scale consists of 22 items which pertain to hobbies, social and community activities, and self-improvement activities. The items are rated on a three-point scale for frequency. One item - "work in the garden or yard" - was deleted in the present study because of unequal access among patients to a yard. The remaining 21 items yield a maximum total score of 63. An important feature of the scales is that parallel patient and family informant forms have been developed. The KAS has been used extensively in a variety of settings and with a wide range of clinical populations for which normative data are available (Hogarty & Katz, 1971; Weissman, 1975). The scales are adequate or better with regard to internal consistency ($r = .61 - .87$), retest reliability ($r = .79 - .90$), and sensitivity to change (Katz & Lyerly, 1963; Weissman, 1975). Concurrent validity (r) for patient and spouse ratings as compared with clinicians' ratings was .67 for the Performance Scale and .79 for the Frequency Scale (Katz & Lyerly, 1963).

Pain Record. A home record-keeping form was developed by the author for use by patients. A parallel form was also designed for spouses. A review of the literature indicated that an adequate home record-keeping schedule did not exist.

The Pain Record for patients consists of five items rated on a 0 - 10 point scale anchored at each end point by a verbal descriptor. These scales are the most frequently used method of pain assessment (Chapman, 1976; Bradley, Prokop, Gentry, Van der Heide & Prieto, 1981). The five items on the patient form cover: (a) verbalization by the patient to the spouse about pain (i.e. pain talk); (b) pain intensity; (c) interference in daily activities due to pain (e.g., time out from activities, time spent resting or in bed, interruption or change in normal pace of activities, avoidance or cancellation of activities due to pain); (d) interference with sleep due to pain (e.g., restless sleep, awakenings due to pain); and (e) total number of hours out of 24 hours the patient experienced pain. Total number of hours the patient felt pain was converted to a ten point scale and was included as an item contributing to the Pain Record Score.

A section on the Pain Record required that the patient record the name, dosage, and amount of all analgesic medication taken for pain. The scoring procedure used for analgesic medication intake was developed for the study in consultation with the Psychopharmacology Unit at the Allan Memorial Institute. Analgesics were grouped into three categories: (a) low strength (e.g., Tylenol or Aspirin), assigned a score of 4; (b) medium strength (e.g., medications containing codeine, anti-inflammatory agents), assigned a score of 5; and (c) high strength (narcotics), assigned a score of 6. Within each category all medications were converted to a standard unit dosage, equivalent to the lowest dosage available for each medication or its equivalent. Dosage of each medication was scored as follows: 1 - 3 units = rating of 1; 4 - 6 units

= rating of 2; 7 - 10 units = rating of 3, etc. The score for daily medication was obtained by multiplying the category of medication by the rating of dosage units taken. The mean score for medication intake at each assessment point was calculated by dividing the sum of the daily scores by the number of days in each assessment period. This was the score used in the study to assess medication intake over time.

The Pain Record for spouses consists of three items also rated on a 0 - 10 point scale anchored at each end point by a verbal descriptor. The items measure: (a) pain talk by the patient to the spouse; (b) pain behavior manifested by the patient in the presence of the spouse (i.e., non-verbal behaviors such as posturing, limping, grimacing, moaning, frequent change in position, etc., which indicated to the spouse that the patient was experiencing pain); and (c) amount of interference observed by the spouse in the patient's activities because of pain.

Level of internal consistency was examined for the items on the patient form and on the spouse form of the Pain Record. Cronbach alpha coefficients (Nunnally, 1970) were .71 and .75 respectively, indicating an adequate level of internal consistency among the items on each form.

Range of Motion. Range of Motion is a widely used index of the patient's flexibility of movement which is obtained by physical examination (Miller, 1985). The patient's flexibility of movement reflects the degree of structural pathology (e.g., fusion resulting from surgery) and functional disability resulting from inactivity and/or emotion-related factors (Bradley and Wood, 1982). Impaired range of motion attributable to inactivity and emotion-related factors would be expected to improve with behavioral interventions and physiotherapy.

Range of Motion of the dysfunctional joint is scored on a 0 - 5 point scale, where 0 represents immobility and 5 represents normal flexibility of movement. Evaluation of the patient's Range of Motion in the present study was done at each assessment point by a staff physiotherapist at the Royal Victoria Hospital (RVH) who was blind to the patient's treatment status. Inter-rater reliability between the physiotherapist assessor and two other staff physiotherapists was checked in a preliminary pilot study. Twenty chronic patients who attended the RVH physiotherapy clinic were examined in counter-balanced order by three physiotherapists. The average inter-rater correlation (r) across all items was .90. Percentage agreement for the three raters ranged from 88 to 96% across items. Thus, a high level of inter-rater reliability was demonstrated.

Treatment

Inpatients and outpatients received a comprehensive behavior therapy package which included relaxation training, operant therapy, and cognitive behavior therapy.

Relaxation training. Progressive muscle relaxation was administered in the manner described by Bernstein and Borkovec (1973). Relaxation training was presented to patients as a technique designed to relax the muscles implicated in musculoskeletal pain and for use as a strategy to cope with the stress associated with pain. Initially, patients were taught to tense and to relax 16 muscle groups throughout the body. The exercises were then combined and reduced to cover four muscle groups. Subsequent steps of the procedure included "recall", counting" and "differential relaxation" (see Bernstein & Borkovec, 1973, pp. 35, 36, and 39). Relaxation through recall involved imagining the sensations

associated with the release of tension of muscle groups. Relaxation by counting involved counting from 1 to 10 while using self-instructional cues to relax (e.g., "One, two ... arms and hands becoming more and more relaxed"). Differential relaxation training entailed identifying and relaxing the particular muscle group associated with pain during daily activity. Beginning with the third week of treatment, patients were taught to use pleasant imagery to relax (Turk et al., 1983). Patients chose and practised imagining three pleasant scenes which they used on a rotating basis after each relaxation practice. Following training, patients were instructed to maintain a minimum relaxation schedule consisting of relaxation exercises for 16 or four muscle groups, as preferred, once per day; counting, once per day; and differential relaxation, three times per day. In addition, patients were instructed to use relaxation procedures in problematic situations as needed.

Operant therapy. Patients received operant therapy in the manner described by Fordyce et al., (1973) and Fordyce, (1976). At the onset of treatment, target goals tailored to each patient's condition were set for medication and for activity. Narcotics were prescribed on a time-contingent basis and were gradually eliminated over the six-week treatment period. Other analgesics were changed to acetominophen and were reduced as much as possible or were eliminated over the six weeks. The operant treatment approach was designed to reduce reliance on all pain-related medication (e.g., anti-inflammatory medication, anxiolytics, anti-depressants, hypnotics), except where contra-indicated on medical grounds. At the same time, patients participated in activities which were gradually increased in duration and frequency. These included

exercise, role responsibilities, socializing, and work-related tasks. Daily rest periods were scheduled as a reinforcer to activity and were gradually reduced over six weeks. Patients were taught how to make decisions about activity and rest appropriate to their medical status. They recorded their performance on a daily progress sheet. Individuals who were on leave of absence from work before treatment were strongly encouraged to return to work or to undergo retraining following treatment. Finally, patients were taught to identify their pain and well behaviors. The adverse effects of chronic pain behavior for the patient and the family were identified. Patients were encouraged not to express pain behavior so that these adverse effects could be reduced. They were told that the treatment team and their spouse would ignore pain behavior to help them to achieve this goal.

Nursing staff applied operant therapy only for inpatients. Contingent reinforcement of pain behavior and of well behavior described by Fordyce (1976) began immediately for inpatients on admission to hospital. Nurses were instructed to respond to pain behavior by ignoring it and by diverting the patient's attention and the conversation away from pain to an issue related to the patient's psychosocial functioning (e.g., family relationships or work). Nurses were also instructed to encourage well behavior (e.g., activity, socialization) and expression of feelings by giving contingent attention, feedback, and praise. Beginning with the second week of treatment, nurses reviewed the patient's daily progress sheet and gave feedback and praise at the end of the day for each goal the patient had accomplished (see Appendix G for instructions to hospital staff). Three nurses who participated in the study received

training from the author prior to the onset of the study. Instruction, role-playing, and modeling were used to illustrate patient behaviors and appropriate staff responses. To check that the nurses could identify reliably pain and well behavior, three nurses observed and recorded the behaviors of five chronic pain patients in the Pain Relief Unit. Behavioral observation of each patient was done on ten separate occasions over a period of one week. Range of percentage agreement across behaviors for the three nurses was high (92% - 97%).

Spouses participated in operant therapy for inpatients and outpatients. Spouses were taught to identify the pain behaviors and the well behaviors of their partner. They were instructed (a) not to reinforce pain behavior with attention; with assistance not merited by the patient's medical status; with offers of bedrest, medication, massage, or other reinforcement of pain behavior; (b) to respond to pain behavior by ignoring it and by diverting conversation away from pain to other issues; (c) to respond to well behavior and to the expression of feelings with attention and encouragement; and (d) to encourage the patient to use strategies learned in treatment to cope with pain and stress. Rationale for the use of operant principles at home to help reduce disability was presented (Fordyce, 1976). Modeling, role-playing, and imaginal practice of appropriate response alternatives were used with spouses to facilitate acquisition of reinforcement skills. Spouses applied operant contingencies at home beginning with the second week of treatment. Also beginning with the second week, spouses reviewed the patient's daily progress sheet and gave encouragement and praise at the end of the day for each goal the patient had accomplished. Spouses

received feedback and praise from the therapist for their efforts to apply operant contingencies at home. Spouses were encouraged to express their feelings about handling the operant procedure in sessions with the therapist.

Cognitive behavior therapy. Cognitive behavior therapy as described by Turk et al., (1983) and Meichenbaum (1985) included several components which were introduced to patients in the following sequence:

1. Conceptualization phase.
2. Daily record-keeping in a "pain and stress diary", (Turk et al., 1983) so that precipitants of pain and anxiety could be identified.
3. Identification of cognitive and behavioral strategies spontaneously used by the patient to cope with pain and stress, and of their effects.
4. Design of individually tailored cognitive pain coping packages which included attention-diversion, reinterpretation, relaxation with imagery, and self-instructional training (Meichenbaum, 1985).
5. Graded practice in imagination and in vivo of coping strategies. Patients identified pain scenes of graded difficulty. They received stress inoculation training (Meichenbaum, 1985) directed at these pain scenes, and they were instructed to apply the new strategies to cope with exacerbations of pain.
6. Problem solving training for pain and stress (Meichenbaum, 1985). Patients identified pain-related stresses and other problem areas (e.g., marital or work problems, social anxiety) with which they wished to cope more effectively. Problem solving training involved having the patient learn to identify and to replace dysfunctional

thoughts, feelings, and behavior associated with stress with more adaptive cognitive and behavioral coping strategies. Practice in imagination and in vivo of effective problem solving followed. Beginning with the third week of treatment, patients completed written problem solving assignments in preparation for their sessions. Each group met in the absence of the therapist for one hour twice weekly in order to work together to find adaptive solutions to the issues they had selected. At the patient-led sessions group members took on the roles of co-ordinator and secretary on a rotating basis. The secretary provided the author with a written summary of the group's work at each session. The aim of assignments and patient-led groups was to increase the patient's active participation in treatment.

7. Social skills and/or assertiveness training procedures involving graduated exposure to the problematic situation(s) were also used for cases where behavioral assessment indicated deficiencies in social skills.

Relapse prevention training. After the six-week period of intensive treatment, inpatients were discharged from hospital. Both inpatients and outpatients continued to meet with the author once a week for a further period of four weeks. The purpose of these sessions was to work on the maintenance and generalization of treatment gains (Meichenbaum, 1985). Patients were instructed to continue regular practice of relaxation and cognitive behavioral strategies on a long-term basis. The importance of continued practice for the maintenance of treatment gains was emphasized. Patients were told to expect downward fluctuations in pain and mood to

which they were to respond with their newly acquired coping strategies. Imaginal and behavioral rehearsal in this four week period of relapse prevention training was targeted at practice in coping with exacerbations of pain and other symptoms that might recur in the future. The approach of anticipating set-backs was used to consolidate cognitive-behavioral skills and to help strengthen the patient's capacity to cope with set-backs without relapse.

Spouses met with the therapist once a week only during the intensive six-week treatment phase, and not subsequently. The importance of continued use of operant principles for chronic pain-related behaviors and for well behaviors was explained to spouses. In sessions 5 and 6 the spouses rehearsed coping with possible set-backs in the same way as described for patients. Spouses were advised, however, not to ignore their partner's complaints of acute pain or illness which might occur in the future without the advice of the patient's physician.

Procedure

The data collection phase of the study spanned a period of twelve weeks for wait-list control patients and twenty-four weeks for inpatients and outpatients. Table 4 summarizes the sequence of assessment, treatment, and follow-up. All subjects (patients and spouses) completed phases 1 to 3. Only treated subjects received the three-month follow-up assessment. Wait-list control patients could not be included in the three-month follow-up for ethical reasons. Their period of waiting for treatment would have been extended to an ethically unacceptable six months. Control subjects entered the treatment program twelve weeks after admission to the study. Contact with control patients was limited

Table 4

Schedule of Procedures

Phases of Study	Duration	Assessment Time Points
1. Pre-Treatment	2 weeks	Pre-Treatment Baseline: monitoring begins 2 weeks prior to treatment
2. Treatment for Inpatients and Outpatients Waiting Period for Controls	6 weeks	Post-Treatment: close of 6 weeks intensive treatment or waiting period
3. Relapse Prevention Training for Treated Patients Waiting Period for Controls	4 weeks	Post-Treatment + 4 weeks
4. Three-Month Follow-up (treated patients only)	12 weeks	Post-Treatment + 16 weeks

to the assessment procedures (see below) until they entered treatment.

Candidates for the study were referred by physicians to the Pain Relief Unit of the Allan Memorial Institute, where the research was conducted. They and their spouses were interviewed by the author. The candidate was then examined by a staff neurologist at the Montreal Nerological Institute. This was followed by an interview with a staff psychiatrist at the Allan Memorial Institute. Candidates who were selected and their spouses met with the author a second time prior to pre-treatment assessment in order to complete the consent form (see Appendix H).

Because there were only five beds in the Inpatient Pain Relief Unit, it was not possible to admit more than five inpatients at a time for the 6-week treatment period. Therefore, a treatment sample at any given time consisted of not more than 4 or 5 inpatients and their outpatient and control counterparts for each treatment run. Three treatment runs were required to complete the data collection for the 41 patients. Hospital policy required that beds be filled immediately following discharge of each set of inpatients. Due to a limited pool of patients at the time of the third run, it was necessary to run the third subgroup of inpatients and their matched outpatients immediately. Their matched controls were run shortly thereafter.

Patients were treated in groups of 4 or 5 for six weeks. Inpatients were admitted for six weeks to the Pain Relief Unit. During this period the inpatients stayed in hospital Monday through Friday and went home on weekends. Treatment for inpatients and outpatients consisted of 18 1 1/2 hour sessions of behavior therapy given three times a week. They also

received physiotherapy once a week. While in hospital, inpatients also received occupational therapy for two 1 1/2 hours twice a week and they met daily with nursing staff. Spouses of inpatients and outpatients attended a 1 1/2 hour session once a week for six weeks, also in groups of 4 or 5.

Behavior therapy was carried out by the author who is a trained behavior therapist. Physiotherapy was administered by a senior staff physiotherapist of the RVH physiotherapy clinic who had been trained to treat chronic pain patients. Medical aspects of the treatment for inpatients and outpatients, such as prescription of medication, were handled by the Pain Relief Unit psychiatrist (Service Chief). The psychiatrist attended group therapy for all pain patients in treatment once weekly for approximately twenty-minutes in order to deal with patients' medical concerns. Weekly staff meetings were held in the Pain Relief Unit for discussion and co-ordination of treatment for inpatients.

Inpatients and outpatients completed the measures (see Table 3) at each of the four assessment times outlined in Table 4. Control patients completed these measures three times. For ethical reasons mentioned earlier, they could not be assessed at three-month follow-up. Spouses completed the Hopkins Symptom Checklist, Katz Performance Scale, Katz Frequency Scale, and Pain Record at each assessment point. Patients completed the measures at the Allan Memorial Institute in groups of 4 or 5. Their spouses were also group-tested at the same time in a separate room. To control for order effects, the scales were completed in counter-balanced order across assessment points. The author met briefly with each patient and spouse following completion of the battery of tests

in order to check for item omissions and to correct for errors in understanding instructions.

Record-keeping on the Pain Record was completed by patients and spouses in their homes so that data collecting conditions for the three groups could be comparable. Each time of assessment consisted of two consecutive weekends of Saturdays and Sundays from 8 a.m. to 10 p.m. The Pain Record was completed once per day at 10 p.m. or before retiring if earlier than 10 p.m. Patients were told that their spouses would be observing and recording their behavior. Subjects were instructed to (a) complete their forms privately; (b) place the completed form in an envelope to be immediately sealed; and (c) refrain from discussing their contents with spouses. The author repeated these instructions once weekly at each assessment point. All subjects reported that they had complied with these instructions. During each assessment phase, the author met once weekly with each patient and spouse in order to check for item omissions or errors in record-keeping.

The study was designed to examine treatment effect using a 3(groups) x 3(assessment time points) mixed design, with subjects nested in treatment group and repeated measures on time. A 2 x 4 mixed design with two treatment groups and four repeated measures was used to examine separately the treatment effects for the inpatients and outpatients with the three month follow-up interval as the fourth assessment point.

Results

Pearson correlation coefficients were computed to examine covariations among the dependent variables at pre-treatment. To control for Type 1 error a conservative alpha level of $p < .002$ was established using the Bonferroni (Larzelere and Mulaik, 1977) multistage procedure. The correlations which emerged as significant ($df = 39$) were as follows: Pain Record and Present Pain Intensity ($r = .73$, $p < .0001$); Pain Record and Medication Intake ($r = .46$, $p < .002$); Range of Motion and Present Pain Intensity ($r = -.46$, $p < .002$); Range of Motion and Medication Intake ($r = -.49$, $p < .001$); Katz Performance and Katz Frequency Scales ($r = .47$, $p < .002$). Group differences in dependent variable correlation coefficients were tested for significance by converting the coefficients to Fisher Z scores and calculating a normal deviate (Ferguson, 1981). None of these group differences was significant.

The general pattern of intercorrelations argued for a multivariate approach to data analysis. Multivariate analysis of variance (MANOVA) with a total sample of 41 patients and eight dependent variables allowed for an adequate subject-to-variable ratio of 5 to 1. The assumption of homogeneity of variance was verified using Cochran C and Bartlett-Box tests (Cochran, 1951; Box, 1954) in all analyses. The data fulfilled this assumption in all cases except for medication intake. To meet the assumption of homogeneity of variance scores on this measure were converted to logarithm scores using an $X = LOG (X + .5)$ transformation (Winer, 1971). Cochrans C and Bartlett-Box tests verified homogeneity of variance for the transformed data, which were then used in all the analyses of variance. The assumption of homogeneity of covariance for

the repeated measures was tested using Bartlett's Test of Sphericity (Larzelere & Mulaik, 1977). To correct for the effect of any violations of homogeneity of covariance conservative degrees of freedom were used in all analyses to insure an alpha level of $p < .05$. Conservative degrees of freedom were determined as follows: Numerator and denominator degrees of freedom for all sources involving repeated measures were divided by the degrees of freedom of the repeated measures (Winer, 1971).

The full sample of men and women was used to test for group effects at pre-treatment and for treatment effects over time and by treatment condition. Use of the full sample respected MANOVA assumptions and allowed adequate control for Type 1 error. It was necessary, however, to determine whether sex of patient and sex of spouse influenced the results. Since the study was examining the effectiveness of the treatment package and the differential effects of treatment condition, the question was whether sex (of patient and of spouse) as a factor was interacting with these variables. To check for this possibility all analyses with the three treatment groups were run a second time with sex included as a factor. These analyses, without exception, indicated that there were no significant Group x Sex, Time x Sex, or Group x Time x Sex interactions (See Appendix I and J for ANOVA Summary Tables). For purposes of completeness, however, the analyses reported below include sex as a factor when it exerted a significant main effect.

Patient Data

Dependent measures at pre-treatment. A one-way MANOVA to test for group differences on the eight dependent measures at pre-treatment was non-significant. Table 5 presents the means and standard deviations for

Table 5

Pre-Treatment Means (and Standard Deviations)

Measure	Group		
	Inpatient	Outpatient	Control
Pain Rating Index	27.25 (12.52)	27.65 (9.92)	27.42 (10.05)
Present Pain Intensity	3.17 (1.19)	2.53 (1.01)	2.92 (1.00)
Pain Record	3.55 (3.28)	3.28 (1.50)	3.42 (1.14)
Analgesic Medication	16.42 (18.05)	15.76 (21.65)	16.00 (16.59)
Range of Motion	3.68 (1.28)	3.88 (0.84)	3.75 (1.05)
Katz Performance Scale	34.08 (3.90)	34.18 (4.39)	34.17 (2.69)
Katz Frequency Scale	40.58 (4.10)	40.41 (6.07)	40.17 (2.98)
Hopkins Symptom Checklist	113.60 (16.51)	111.10 (20.02)	112.10 (19.68)

the eight dependent measures at pre-treatment by group. Sample size constraints led to the decision to use a maximum of four dependent variables in a MANOVA when sex was included as an additional independent factor. The four self-report pain variables were selected for a 3 x 2 (Group x Sex) MANOVA because of their pattern of covariation. A 3 x 2 (Group x Sex) MANOVA was computed on the four other measures. The latter MANOVA only showed a significant main effect for Sex, $F(4,32) = 2.68$, $p < .05$. Univariate analysis showed a significant main effect for Sex on one variable: Women obtained significantly higher scores on Range of Motion than men, $F(1,35) = 6.23$, $p < .02$. Means (and standard deviations) for men and women were 3.31 (1.24) and 4.06 (3.78) respectively.

Treatment Effect. Treatment effect over time was tested on the eight dependent measures using a 3 x 3 (Group x Time) mixed design MANOVA with repeated measures for time. There was a significant main effect for Time, $F(16,140) = 4.13$, $p < .0001$, and a significant Group x Time interaction, $F(32,288) = 1.86$, $p < .005$. Univariate analysis indicated that there was a significant Group x Time interaction for the following four pain measures: Pain Rating Index (PRI), $F(2,38) = 5.50$, $p < .01$; Present Pain Intensity (PPI), $F(2,38) = 4.98$, $p < .01$; Pain Record, $F(2,38) = 6.45$, $p < .005$; and Analgesic Medication Intake, $F(2,38) = 3.71$, $p < .05$. Means and standard deviations for the pain measures at each assessment point for each group are presented in Table 6.

Tukey post-hoc tests with the harmonic mean modification (Winer, 1971) and an alpha level of $p < .05$ were performed to analyze pairwise

Table 6

Group Means (and Standard Deviations) Over Time on the Pain Measures

	Pre-Treatment	Post-Treatment	Post + 4 Weeks
Pain Rating Index			
Inpatient	27.25 (12.52)^{a}	17.17 (13.89)^{b,A}	14.00 (16.68)^{b,A}
Outpatient	27.65 (9.92)^{a}	17.18 (8.90)^{b,A}	19.65 (12.56)^{ab,A}
Control	27.42 (10.05)	28.17 (10.05)^{B}	29.92 (11.98)^{B}
Present Pain Intensity			
Inpatient	3.17 (1.19)^{a}	2.17 (1.19)^{b,A}	1.75 (1.36)^{b,A}
Outpatient	2.53 (1.01)	2.29 (1.11)^{AB}	2.47 (1.18)^{AB}
Control	2.92 (1.00)	3.17 (0.72)^{B}	3.33 (0.98)^{B}
Pain Record			
Inpatient	3.55 (3.28)^{a}	2.73 (2.03)^{ab,A}	2.33 (1.80)^{b,A}
Outpatient	3.28 (1.50)	3.13 (1.92)^{A}	2.61 (2.25)^{A}
Control	3.42 (1.14)	4.14 (1.94)^{B}	4.32 (1.74)^{B}
Analgesic Medication			
Inpatient	16.42 (18.05)^{a}	2.00 (5.78)^{b,A}	1.42 (2.71)^{b,A}
Outpatient	15.76 (21.65)	6.88 (13.22)^{A}	8.53 (15.10)^{AB}
Control	16.00 (16.59)	19.42 (16.28)^{B}	21.92 (21.78)^{B}

Note: Means with different superscripts are significantly different at $p < .05$.

a,b = Within group comparisons

A,B = Between group comparisons

means comparisons where significant main effects or interactions occurred. Conservative degrees of freedom were used for the Tukey tests as well as for the analyses of variance. These analyses indicated the following: Inpatients were significantly improved compared with control patients on each of the four pain measures at post-treatment (T2) and at the post-treatment +4 weeks assessment (T3). Outpatients were significantly improved compared with control patients at T2 and T3 on the PRI and Pain Record. Outpatients reported taking significantly less analgesic medication compared with control patients at T2, but this difference was not maintained at T3. Outpatients did not differ from control patients on the PPI at T2 or at T3. There were no differences between inpatients and outpatients on any measure at T2 or at T3.

Tukey tests indicated, however, that a more consistent treatment effect occurred for inpatients than for outpatients. Inpatient improvement on the PRI, PPI, and Medication Intake was significant at T2 and was maintained at T3. Inpatient improvement on the Pain Record was significant at T3. In contrast, the only significant improvement for outpatients occurred on the PRI at T2, and this improvement was not maintained at T3. There were no changes over time on any measure for control patients.

There was no significant main effect for Time and no significant Group x Time interaction on the Katz Scales and Range of Motion. On the Hopkins Symptom Checklist (HSCL) there was a significant main effect for Time, $F(1,38) = 23.69$, $p < .001$, but no significant Group x Time interaction. Tukey tests indicated that psychopathology decreased significantly at T2 for all three groups, and the decrease was maintained

at T3 (M1 = 112.12, S.D. = 18.52; M2 = 100.17, S.D. = 19.23; M3 = 97.76, S.D. = 20.90).

Results for inpatients and outpatients at three-month follow-up (T4). As stated earlier, (see Method Section) only the treated groups (N = 29) were assessed at three-month follow-up. Constraints of the reduced sample size led to the decision to use a maximum of four dependent variables in a MANOVA. The four self-report pain variables were examined in a 2 x 4 (Group x Time) MANOVA because of their pattern of covariation. The other four variables were examined in a second 2 x 4 MANOVA. Results of the MANOVA on the pain variables showed a significant main effect for Time, $F(12,240) = 5.38$, $p < .0001$, but no significant Group x Time interaction. Univariate analysis showed that a significant effect for Time occurred as follows: PRI, $F(1,27) = 20.88$, $p < .0001$; PPI, $F(1,27) = 8.37$, $p < .01$; Pain Record, $F(1,27) = 13.60$, $p < .001$; Analgesic Medication Intake, $F(1,27) = 10.68$, $p < .005$. Tukey tests indicated that improvement in the treated groups on the PRI and Medication Intake was significant at T2 and was maintained thereafter. Improvement on the PPI and Pain Record was significant at T3 and was maintained at T4.

The 2 x 4 MANOVA on Range of Motion, Katz Scales, and HSCL showed a significant main effect for Time, $F(12,240) = 4.07$, $p < .0001$, but no significant Group x Time interaction. Univariate analysis indicated a significant main effect for Time only on the HSCL, $F(1,27) = 18.27$, $p < .001$. Tukey tests indicated that improvement in psychopathology for treated patients was significant at T2 and was maintained thereafter. Means and standard deviations for treated patients over time on the pain

Table 7

Means (and Standard Deviations) for Treated Patients Over Time on the Measures of Pain and Psychopathology

	Pre-Treatment	Post-Treatment	Post + 4 Weeks	3 Mo. Follow-up
Pain Rating Index	27.48 (10.86)a	17.17 (11.0)b	17.31 (14.41)b	14.07 (12,18)b
Present Pain Intensity	2.79 (1.11)a	2.24 (1.12)ab	2.17 (1.28)b	1.86 (1.27)b
Pain Record	3.39 (1.48)a	2.97 (1.94)ab	2.49 (2.05)b	2.14 (1.83)b
Analgesic Medication	16.03 (19.90)a	4.86 (10.91)b	5.59 (12.08)b	5.14 (15.30)b
Hopkins Symptom Checklist	112.14 (18.37)a	98.34 (19.00)b	94.38 (19.36)b	92.38 (19.77)b

Note: Means with different superscripts are significantly different at $p < .05$.

measures and HSCL are presented in Table 7.

Spouse Data

Dependent measures at pre-treatment. As stated in the Method Section, spouses completed four dependent measures at each assessment point. Scores on the HSCL represent self-reported spousal psychopathology. Spouses rated patients' socially expected activity on the Katz Performance Scale and patients' free-time activity on the Katz Frequency Scale. Record keeping by spouses of patients' pain behavior was based on their observations of patients at home. Pearson correlation coefficients were computed to examine covariations among these spouse-derived measures at pre-treatment. A conservative alpha level of $p < .002$ was established using the Bonferroni (Larzelere and Mulaik, 1977) multistage procedure for correlations presented here and in the next section. One significant correlation was found between spouse ratings of patients on the Katz Performance Scale and the Pain Record ($r(df = 39) = -.48$, $p < .002$). There were no group differences in the correlations between spousal measures.

The correlational data indicated that scores on the HSCL could be examined on a univariate level. A MANOVA was used for the other three measures. The one-way ANOVA testing for group differences on the HSCL was not significant. The one-way MANOVA testing for group differences on the Katz Scales and Pain Record at pre-treatment also yielded non-significant results. Thus, there were no significant differences between inpatients, outpatients, and controls at pre-treatment on the spousal measures. A 3 x 2 (Group x Sex) MANOVA on the Katz Scales and Pain Record showed a significant main effect for Sex, $F(3,33) = 5.50$,

$p < .01$. Univariate analysis indicated that a sex difference occurred on one measure: Female patients were rated by their spouses as significantly more active on the Katz Frequency Scale at pre-treatment ($M = 40.46$, S.D. = 3.84) than were male patients ($M = 37.0$, S.D. = 3.68), $F(1,35) = 7.04$, $p < .01$. Group means and standard deviations for the four spousal measures at pre-treatment are shown in Table 8.

Relation between patient and spouse ratings at pre-treatment. Pearson correlation coefficients were computed between patient and spouse ratings at pre-treatment on the common measures pertaining to the patient. The correlation between patient and spouse ratings on the Katz Performance Scale was significant ($r = .64$, $p < .0001$). This was also the case for the Pain Record ($r = .50$, $p < .001$), but not for the Katz Frequency Scale ($r = .29$). To ascertain if spousal psychopathology was related to patient symptomatology at pre-treatment, Pearson correlation coefficients were computed between scores of spouses on the HSCL and each of the eight patient measures. All correlations were non-significant. There were no reliable differences between groups in the patient-spouse correlational data.

Spouse ratings of treatment effect. A 3 x 3 (Group x Time) ANOVA tested for treatment effect on spouse psychopathology. There was a significant main effect for Time, $F(1,38) = 4.22$, $p < .05$, but no significant Group x Time interaction. Tukey tests indicated that improvement in psychopathology was significant at T3 for all three groups ($M1 = 98.10$, S.D. = 27.36; $M2 = 92.63$, S.D. = 27.80; $M3 = 91.44$, S.D. = 29.89). A three-way ANOVA (Group x Time x Sex) on this measure showed a significant main effect for Sex, $F(1,35) = 4.38$, $p < .05$. Significantly

Table 8

Pre-Treatment Means (and Standard Deviations) for Spouses

Measure	Group		
	Inpatient	Outpatient	Control
Hopkins Symptom Checklist	98.33 (29.18)	98.47 (33.24)	97.33 (16.23)
Katz Performance Scale	34.50 (3.29)	34.41 (4.76)	33.50 (2.84)
Katz Frequency Scale	39.33 (3.31)	39.76 (3.85)	38.25 (5.21)
Pain Record	2.06 (1.33)	2.16 (1.51)	2.08 (1.21)

higher psychopathology scores were recorded for male spouses (M = 105.07, S.D. 35.41) than for female spouses (M = 87.71, S.D. = 18.11).

A 3 x 3 (Group x Time) MANOVA tested for treatment effect on spouse ratings of patients on the Katz Scales and Pain Record. There was a significant main effect for Time, $F(6,150) = 2.41$, $p < .05$ and a significant Group x Time interaction, $F(12,228) = 2.32$, $p < .01$. Univariate analysis showed a significant Group x Time interaction for the Katz Frequency Scale, $F(2,38) = 3.91$, $p < .05$ and for the Pain Record, $F(2,38) = 4.59$, $p < .02$, but not for the Katz Performance Scale. Means and standard deviations for the Katz Frequency Scale and Pain Record at each assessment point for each group are presented in Table 9.

Tukey tests indicated that, according to their spouses, inpatients engaged in significantly more free-time activity and showed significantly less pain behavior at T2 and T3 compared with control patients. Outpatients were rated by their spouses as significantly more active than control patients at T3. However, ratings for outpatients and controls in regard to pain behavior did not differ at T2 or at T3. A significant difference emerged between spouse ratings of inpatients and spouse ratings of outpatients on the Pain Record. Tukey tests revealed that spouses of inpatients reported significantly less pain behavior at T3 than spouses of outpatients.

Tukey tests also indicated that spouse-rated improvement over time was reliable only for inpatients. Spouse ratings of inpatient improvement in pain behavior was significant at T2 and was maintained at T3; improvement in level of free-time activity was significant at T3. Spouse ratings of outpatients did not reveal reliable change over time.

Table 9

Group Means (and Standard Deviations) Over Time for Spouse Ratings of Patients' Free-Time Activity and Pain Behavior

	Pre-Treatment	Post-Treatment	Post + 4 Weeks
Katz Frequency Scale			
Inpatient	39.33 (3.31)^{a}	40.75 (5.15)^{ab,A}	42.42 (5.52)^{b,A}
Outpatient	39.76 (3.85)	39.71 (4.25)^{AB}	39.41 (3.64)^{A}
Control	38.25 (5.21)	37.33 (5.63)^{B}	36.25 (5.22)^{B}
Pain Record			
Inpatient	2.06 (1.33)^{a}	0.71 (0.91)^{b,A}	0.39 (0.57)^{b,A}
Outpatient	2.16 (1.51)	1.75 (1.55)^{AB}	1.55 (2.30)^{B}
Control	2.08 (1.21)	2.47 (1.94)^{B}	2.52 (1.67)^{B}

Note: Means with different superscripts are significantly different at $p < .05$.

a,b = Within group comparisons

A,B = Between group comparisons

This was also the case for spouse ratings of control patients.

Results for spouses of inpatients and outpatients at three-month follow-up (T4). A 2 x 4 (Group x Time) ANOVA on spouse scores on the HSCL showed a significant main effect for Time $F(1,26) = 4.90$, $p < .05$, but no significant Group x Time interaction. There was a reliable decrease in psychopathology for spouses of both inpatients and outpatients at T4.

A 2 x 4 (Group x Time) MANOVA on spouse ratings of patients on the Katz Scales and the Pain Record showed a significant main effect for Time, $F(9,225) = 4.77$, $p < .0001$, but no significant Group x Time interaction. Univariate analysis indicated a significant main effect for Time on the Katz Performance Scale, $F(1,25) = 7.06$, $p < .01$ and on the Pain Record, $F(1,25) = 15.31$, $p < .001$. Tukey tests showed that improvement in spouse ratings of treated patients' socially expected activity and pain behaviour was significant at T3 and was maintained at T4. Means and standard deviations for spouses of treated patients over time on the HSCL, Katz Performance Scale, and Pain Record are presented in Table 10.

Table 10

Means (and Standard Deviations) Over Time for Spouses of Treated Patients: Spousal Psychopathology and Ratings of Patients' Social Activity and Pain Behavior

	Pre-Treatment	Post-Treatment	Post + 4 Weeks	3 Mo. Follow-up
Hopkins Symptom Checklist	99.32 (31.25)a	93.07 (31.09)ab	91.93 (34.41)ab	86.61 (31.39)b
Katz Performance Scale	34.22 (4.15)a	35.04 (3.79)ab	36.04 (3.35)b	37.04 (3.78)b
Pain Record	2.20 (1.40)a	1.36 (1.44)ab	1.10 (1.87)b	0.70 (1.32)b

Note: Means with different superscripts are significantly different at $p < .05$.

Discussion

The present results replicated and extended previous evidence of the effectiveness of behavior therapy as a treatment for chronic pain. These findings are of particular interest for a number of reasons. As far as can be determined, this is the first controlled study that evaluated a full complement of operant and cognitive behavioral techniques as a treatment package for chronic pain; examined the influence of hospitalization on treatment; assessed and treated spouses; and utilized several patient and spousal parameters to assess treatment effects. The results in general indicated that a comprehensive behavior therapy program that includes operant therapy as well as cognitive behavior therapy ameliorates pain symptoms of chronic pain patients who do not benefit from medical treatment.

It appears reasonable to assume that these positive results are not limited to the patients seen in the present study. The patient sample was representative of chronic pain patients who are typically referred to a pain center for behavioral treatment. Such patients report that medical treatment has not ameliorated their chronic pain. Patients in the present study experienced pain for over a decade despite appropriate interventions. Baseline pain-related distress as measured by the McGill Pain Questionnaire was at the upper limit of severity reported for pain samples (Melzack, 1975). Of the 41 patients, 30 (73%) were taking medication for pain on a daily basis. Pain disrupted activities and sleep in all cases. Consistent with other reports of psychiatric disturbance in chronic pain patients (cf. Shanfield et al., 1979), the patients in this study reported a high level of psychopathology on the

Hopkins Symptom Checklist (Derogatis, et al., 1974). Emotional distress reported by patients before treatment was at a level similar to that of anxious psychiatric outpatients (Rickels et al., 1972). In addition, the level of psychopathology of spouses was found to be elevated (Derogatis et al., 1974).

Although the general effect of the behavior therapy package was positive; improvement was not consistent across the measures of change. Patients who received comprehensive behavior therapy either in hospital or on an outpatient basis reported improvement on the Pain Rating Index of the McGill Pain Questionnaire and on record keeping of pain symptoms at home (Pain Record). As hypothesized, the improvement on these parameters was maintained at three month follow-up. Treated patients reported that their pain and its adverse effects were reduced to manageable limits for the first time in many years.

Contrary to expectation, treated patients did not record improvement in their activity on the Katz Performance and Frequency Scales. Their spouses, however, did report improvement for patients on the Katz Frequency Scale. These findings are consistent with those of other studies which indicate that chronic pain patients tend to underestimate their activity when their reports are compared with other assessment sources (e.g., automated recording of activity and observation by staff (Kremer & Block, 1981; Sanders, 1983; Schmidt, 1985). Another factor which may influence these findings is the globality of the measure of change used. Measures of psychosocial functioning such as the Katz Scales, whose use with chronic pain patients is increasing (Turner, 1982; Moore & Chaney, 1985), may not be adequately sensitive to changes in

specific pain-related and well behaviors. For example, patients reported substantial improvement after treatment and at follow-up in their capacity to engage in physical exercise such as walking and swimming. Their scores on the Katz Scales did not reflect this result, probably because only two items on the Katz Frequency Scale assess physical exercise. Specific self-monitoring formats and exercise measures have recently been developed to assess the activity of chronic pain patients (Follick, Ahern & Laser & Wolston, 1984; Keefe & Hill, 1985; Linton, 1985) and await further validation. Such measures may be more relevant in the evaluation of behavioral treatments of chronic pain.

The range of motion exhibited by patients during physiotherapy examination also did not improve as a result of behavior therapy. While this finding was not consistent with the study's hypothesis, a possible explanation is the operation of a ceiling on the amount of improvement in range of motion that could be attained by treated patients. Many of the patients had an organic basis for their pain (e.g., surgical fusion, degenerative disc disease, arthritis) the effect of which was a limited range of motion.

The hypothesis that treated patients and their spouses would report more improvement in psychopathology than controls was also not supported. Psychopathology levels for inpatients, outpatients, and control patients were lower after the treatment or waiting period and remained so four weeks later. Psychopathology levels for spouses were also lower in all three groups. Several studies have reported improvement in the psychiatric status of pain patients following multi-disciplinary pain treatment. These studies, however, did not have a control group of

patients (Robert & Reinhardt, 1980; Moore, Berk & Nypaver, 1984; Meilman, Guck, Skultety, Robbins & Jensen, 1986). The present findings suggest that non-specific, reactive factors such as anticipation of help, self-monitoring, or contact with a therapist for assessment can reduce anxiety and depression at least in the short term. It may be mentioned in this context that several control patients and spouses reported anticipating the forthcoming treatment with relief because they viewed it as an opportunity to work on pain-related problems that were not dealt with in previous modes of treatment. It would be difficult on ethical grounds, however, to continue to withhold treatment for control patients in order to determine the durability of such reactive effects.

The hypothesis that inpatients would report significantly more improvement after treatment and at follow-up than outpatients was not supported. There were no significant differences between inpatients and outpatients over time on the patient self-report measures. The results did indicate, however, that there was a more consistent positive treatment effect across measures of change for inpatients than for outpatients. A reliable positive treatment effect was demonstrated for inpatients on all four pain measures. Inpatients reported improvement after treatment relative to controls on the Pain Rating Index, Present Pain Intensity, Pain Record, and Analgesic Medication Intake. These improvements were maintained after relapse prevention training and at three month follow-up. Outpatients showed improvement after treatment relative to controls only on three measures of change: The Pain Rating Index, Pain Record, and Analgesic Medication Intake. Four weeks after the intensive treatment phase, however, outpatients had increased their

medication and no longer differed from controls on this measure. Outpatients also did not report improvement in pain intensity after treatment relative to controls. With the exception of the Pain Rating Index, improvement on the pain measures over time was not reliable for outpatients. The results for spouses also point to differential treatment effects for inpatients and outpatients. Only the inpatients were rated by their spouses as improved relative to controls in activity and in pain behavior. Also, spouse-rated improvement in these symptoms over time was reliable only for inpatients. This difference between inpatients and outpatients in consistency of positive treatment effects across measures and over time provides support for the hypothesis that hospitalization assures a more reliable and enduring positive outcome for behaviorally treated pain patients than does outpatient intervention.

More research using a larger sample than was possible to follow in the present study is needed to clarify further the influence of the treatment milieu on the effectiveness of comprehensive behavior therapy. As Fordyce (1976) has noted, the importance of the milieu may vary with the population examined. A period of hospitalization may be necessary for patients who are severely disabled, who are addicted to narcotics, and whose inter-personal relationships are poor. Patients with less disability may do equally well or better on an outpatient basis.

Several factors associated with hospitalization merit further study. Inpatients may decrease pain behaviors more than outpatients because operant therapy is more effectively applied by trained staff in hospital than by spouses at home. It may be that patients who are able to reduce their medication intake and their pain behavior as a result of operant

therapy also become more receptive at this time to learning alternate coping strategies for pain. Thus, it may be that a combination of operant and cognitive behavior therapy in hospital is more effective than outpatient treatment for patients who are severely disabled by their pain.

The opportunity for more group interaction and cohesion in hospital, factors which have been shown to influence treatment outcome (Moore, et al., 1984), may also be an important treatment variable. In the present study, inpatients shared their living quarters and had meals together in the hospital dining room. Members of outpatient groups met with each other only during treatment sessions. The author observed greater cohesion in inpatient groups than in outpatient groups. Inpatients met together frequently to discuss homework assignments and consistently performed their exercise assignments (e.g., walking, swimming) as a group. Peer pressure to do well seemed to be greater in inpatient than in outpatient groups. In addition, inpatients had ready access to nurses and other hospital staff. As a result, exposure to active therapeutic ingredients other than contingent reinforcement may have also been greater for inpatients. The examination of these factors in future studies may lead to their inclusion as ingredients of effective and less costly outpatient treatment.

The positive findings of the present study prompt further chronic pain research in at least three directions: (a) assessment of particular therapeutic ingredients in operant and cognitive behavioral interventions (e.g., the factors which reduce medication consumption for pain or facilitate the development of particular adaptive cognitive pain coping

strategies); (b) the relative therapeutic influence of specific factors associated with hospitalization; and (c) factors which increase the efficacy of spouses or "significant others" as agents of therapeutic change.

References

Agnew, D.C., & Merskey, H. (1976). Words of chronic pain. Pain, 2, 73-81.

Anderson, L.P., & Rehm, L.P. (1984). The relationship between strategies of coping and perception of pain in three chronic pain groups. Journal of Clinical Psychology, 40(5), 1170-1177.

Aronoff, G.M. (1985). Psychological aspects of nonmalignant chronic pain: A new nosology. In G.M. Aronoff (Ed.), Evaluation and treatment of chronic pain (pp. 471-484). Baltimore, MD: Urban & Schwarzenberg.

Bakal, D.A., & Kaganov, J.A. (1976). A simple method for self-observation of headache frequency, intensity and location. Headache, 16, 123-128.

Barrett, J.E., & Hearst, M.W. (1982). Short-term symptom change in outpatient psychiatric disorders. Archives of General Psychiatry, 39, 849-854.

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

Bernstein, D.A., & Borkovec, T.D. (1973). Progressive relaxation training. Champaign, IL: Research Press.

Blishen, B.R., & McRoberts, H.A. (1976). A revised socio-economic index for occupations in Canada. Canadian Review of Sociology and Anthropology, 13, 71-79.

Block, A.R., & Boyer, S.L. (1984). The spouse's adjustment to chronic pain: Cognitive and emotional factors. Society of Science and Medicine, 19(12), 1313-1317.

Block, A.R., Kremer, E.F., & Gaylor, M. (1980). Behavioral treatment of chronic pain: The spouse as a discriminative cue for pain behavior. Pain, 9, 243-252.

Blumer, D., Heilbronn, M., & Roth, T. (1982). Biological markers for depression in chronic pain. Journal of Nervous and Mental Diseases, 170, 245-248.

Bonica, J.J. (1980). Pain research and therapy: Past and current status and future needs. In L. Ng & J.J. Bonica (Eds.), Pain discomfort and humanitarian care (pp. 1-46). New York: Elsevier.

Bonica, J.J. (1985). Introduction. In G.M. Aronoff (Ed.), Evaluation and treatment of chronic pain. Baltimore, MA: Urban & Schwarzenberg.

Bouras, N., Bartlett, J.R., Neil-Dwyer, G., & Bridges, P.K. (1984). Psychological aspects of patients having multiple operations for low back pain. British Journal of Medical Psychology, 57, 147-151.

Box, G.E.P. (1954). Some theorems on quadratic forms applied in the study of analysis of variance problems. The Annals of Mathematical Statistics, 25, 290-302, 484-498.

Bradley, E.M., & Wood, P.H. (1982). The why and the wherefore of measuring joint movement. Clinics of Rheumatic Diseases, 8(3), 533-544.

Bradley, L.A., Prokop, C.K., Gentry, W.D., Van der Heide, L.H., & Prieto, E.J. (1981). Assessment of chronic pain. In C.K. Prokop & L.A. Bradley (Eds.), Medical psychology: Contributions to behavioral medicine (pp. 91-117). New York: Academic Press.

Buckley, F.P., Sizemore, W.A., & Charlton, J.E. (1986). Medication management in patients with chronic non-malignant pain. A review of the use of a drug withdrawal protocol. Pain, 26, 153-165.

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

Chapman, C.R. (1976). Measurement of pain: Problems and issues. In J.J. Bonica & D.G. Albe-Fessard (Eds.), Advances in pain research and therapy (Vol. 1, pp. 345-353). New York: Raven Press.

Chapman, S.L. (1986). A review and clinical perspective on the use of EMG and thermal biofeedback for chronic headaches. Pain, 27, 1-43.

Chaves, J.F., & Barber, T.H. (1974). Cognitive strategies, experimenter modeling, and expectation in the attenuation of pain. Journal of Abnormal Psychology, 83(4), 356-363.

Clark, M., Gosnell, M., & Shapiro, D. (1977). The new war on pain. Newsweek, 89, 48-58.

Cochran, W.G. (1951). Testing a linear relation among variances. Biometrics, 7, 17-32.

Crue, B.L. (1985). Preface. In G.M. Aronoff (Ed.), Evaluation and treatment of chronic pain. Baltimore, MA: Urban & Schwarzenberg.

Derogatis, L.R., Lipman, R.S., Covi, L., & Rickels, K. (1971). Neurotic symptom dimensions as perceived by psychiatrists and patients of various social classes. Archives of General Psychiatry, 24, 454-464.

Derogatis, L.R., Lipman, R.S., Covi, L., & Rickels, K. (1972). Factorial invariance of symptom dimensions in anxious and depressive neuroses. Archives of General Psychiatry, 27, 659-665.

Derogatis, L.R., Lipman, R.S., Covi, L., Rickels, K., & Uhlenhuth, E.H. (1970). Dimensions of outpatient neurotic pathology: Comparison of a clinical versus an empirical assessment. Journal of Consulting and Clinical Psychology, 34(2), 164-171.

Derogatis, L.R., Lipman, R.S., Rickels, K., Uhlenhuth, E.H., & Covi, L. (1974). The Hopkins Symptom Checklist: A measure of primary symptom dimensions. In P. Pichot & R. Olivier-Martin (Eds.), Psychological measurements in psychopharmacology (Vol. 7, pp. 79-110). Paris: Basel.

De Vries, H.A. (1968). EMG fatigue curves in postural muscles: A possible etiology of idiopathic low back pain. Journal of Physical Medicine, 47, 175-181.

Dubuisson, D., & Melzack, R. (1976). Classification of clinical pain descriptors by multiple group discriminant analysis. Experimental Neurology, 51, 480-487.

Engstrom, D. (1983). Cognitive behavioral therapy methods in chronic pain treatment. Advances in Pain Research and Therapy, 5, 829-838.

Evans, M., & Paul, G.L. (1970). Effects of hypnotically suggested analgesia on physiological and subjective responses to cold stress. Journal of Consulting and Clinical Psychology, 35, 362-371.

Ferguson, G.A. (1981). Statistical analysis in psychology and education (5th ed.). New York: McGraw-Hill.

Feuerstein, M., Sult, S., & Houle, M. (1985). Environmental stressors and chronic low back pain: Life events, family and work environment. Pain, 22, 295-307.

Figueroa, J.L. (1982). Group treatment of chronic tension headaches: A comparative treatment study. Behavior Modification, 6(2), 229-239.

Flor, H., Turk, D.C., & Birbaumer, N. (1985). Assessment of stress-related psychophysiological responses in chronic back pain patients. Journal of Consulting and Clinical Psychology, 53, 354-364.

Follick, M.J., Ahern, D.K., & Laser-Wolston, N. (1984). Evaluation of a daily activity diary for chronic pain patients. Pain, 19, 373-382.

Fordyce, W.E. (1976). Behavioral concepts in chronic pain and illness. In P.O. Davidson (Ed.), The behavioral management of anxiety, depression and pain (pp. 147-188). New York: Brunner/Mazel.

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

Fordyce, W.E., Fowler, R.S., Lehmann, J.F., DeLateur, B.J., Sand, P.L., & Trieschmann, R.B. (1973). Operant conditioning in the treatment of chronic pain. Archives of Physical and Medical Rehabilitation, 54, 399-408.

Fortin, F., & Kirouac, S. (1976). A randomized controlled trial of preoperative patient education. International Journal of Nursing Studies, 13, 11-24.

Friedman, A.S., Cowitz, B., Dohen, H.W., & Granick, S. (1963). Syndromes and themes of psycho-depression. Archives of General Psychiatry, 9, 504-509.

Genest, M., & Turk, D.C. (1979). A proposed model for behavioral group therapy with pain patients. In D. Upper & S.M. Ross (Eds.), Behavioral group therapy: An annual review. Champaign, IL: Research Press.

Goldfried, M.R. (1977). The use of relaxation and cognitive relabeling as coping skills. In R.B. Stuart (Ed.), Behavioral self-management. Strategies, techniques and outcome (pp. 82-116). New York: Brunner/Mazel.

Hackett, G., Horan, J.J., Buchanan, J., & Zumoff, P. (1979). Improving exposure component and generalization potential of stress inoculation for pain. Perceptual and Motor Skills, 48, 1132-1134.

Herman, E., & Baptiste, S. (1981). Pain control: Mastery through group experience. Pain, 10, 79-86.

Hogarty, G.E., & Katz, M.M. (1971). Norms of adjustment and social behavior. Archives of General Psychiatry, 25, 470-480.

Holmes, D.S., & Burish, T.G. (1983). Effectiveness of biofeedback for treating migraine and tension headaches: A review of the evidence. Journal of Psychosomatic Research, 27, 515-532.

Holroyd, K.A., & Andrasik, F. (1978). Coping and the self control of chronic tension headache. Journal of Consulting and Clinical Psychology, 46(3), 1036-1045.

Holroyd, K.A., Andrasik, F., & Westbrook, T. (1977). Cognitive control of tension headache. Cognitive Therapy and Research, 1, 121-133.

Hoon, P.W., Feuerstein, M., & Papciak, A.S. (1985). Evaluation of the chronic low back pain patient: Conceptual and clinical considerations. Clinical Psychology Review, 5, 377-401.

Horan, J.J., Hackett, G., Buchanan, J.D., Stone, C.I., & Demchik-Stone, D. (1977). Coping with pain: A component analysis of stress-inoculation. Cognitive Therapy and Research, 1, 211-221.

Johnson, J.E. (1973). Effects of accurate expectations about sensation on the sensory and distress components of pain. Journal of Personality and Social Psychology, 27, 261-275.

Johnson, J.E., & Leventhal, H. (1974). Effects of accurate expectations and behavioral instructions on reactions during anoxious medical examination. Journal of Personality and Social Psychology, 24, 710-718.

Katz, M.M., & Lyerly, S.B. (1963). Methods for measuring adjustment and social behavior in the community: I. Rationale, description, discriminative validity and scale development. Psychological Reports, 13, 503-535.

Keefe, F.J., & Block, A.R. (1982). Development of an observation method for assessing pain behavior in chronic low back pain patients. Behavior Therapy, 13, 363-375.

Keefe, F.J., Crisson, J.E., Maltbie, A., Bradley, L., & Gil, K.M. (1986). Illness behavior as a predictor of pain and overt behavior patterns in chronic low back pain patients. Journal of Psychosomatic Research, 30(5), 543-551.

Keefe, F.J., Gil, K.M., & Rose, S.C. (1986). Behavioral approaches in the multidisciplinary management of chronic pain: Programs and issues. Clinical Psychology Review, 6, 87-113.

Keefe, F.J., & Hill, R.W. (1985). An objective approach to quantifying pain behavior and gait patterns in low back pain patients. Pain, 21, 153-161.

Keel, P.J. (1984). Psychosocial criteria for patient selection: Review of studies and concepts for understanding chronic back pain. Neurosurgery, 15(6), 935-941.

Kerns, R.D., Turk, D.C., & Holzman, A.D. (1983). Psychological treatment for chronic pain: A selective review. Clinical Psychology Review, 3, 15-25.

Knox, V.J. (1973). Cognitive strategies for coping with pain: Ignoring vs. acknowledging. Dissertation Abstracts International, 34(5-B), 2308.

Kremer, E.F., Block, A., & Gaylor, M.S. (1981). Behavioral approaches to treatment of chronic pain: The inaccuracy of patient self-report measures. Archives of Physical and Medical Rehabilitation, 61, 188-191.

Krishnan, K.R.R., France, R.D., Pelton, S., McCann, U.D., Davidson, J., & Urban, B.J. (1985). Chronic pain and depression: II. Symptoms of anxiety in chronic low back pain patients and their relationship to subtypes of depression. Pain, 22, 289-294.

Langer, E.J., Janis, I.L., & Wolfer, J.A. (1975). Reduction of psychological stress in surgical patients. Journal of Experimental and Social Psychology, 1, 155-165.

Larzelere, R.E., & Mulaik, S.A. (1977). Single-sample tests for many correlations. Psychological Bulletin, 84, 557-569.

Lichtenberg, P.A., Swensen, C.H., & Skehan, M.W. (1986). Further investigation of the role of personality lifestyle and arthritic severity in predicting pain. Journal of Psychosomatic Research, 30(3), 327-337.

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

Linton, S.J. (1986). Behavioral remediation of chronic pain: A status report. Pain, 24, 125-141.

Linton, S.J., & Gotestam, K.G. (1984). A controlled study of the effects of applied relaxation and applied relaxation plus operant procedures in the regulation of chronic pain. British Journal of Clinical Psychology, 23, 291-299.

Linton, S.J., & Melin, L. (1983). Applied relaxation in the management of chronic pain. Behavioural Psychotherapy, 11, 337-350.

Linton, S.J., Melin, L., & Stjernlof, K. (1985). The effects of applied relaxation and operant activity training on chronic pain. Behavioural Psychotherapy, 13, 87-100.

Lipman, R.S., Park, L.C., & Rickels, K. (1965). Sensitivity of symptom and nonsymptom focused criteria of outpatient drug efficacy. American Journal of Psychiatry, 122, 24-27.

Lipman, R.S., Rickels, K., Covi, L., Derogatis, L.R., & Uhlenhuth, E.H. (1969). Factors of symptom distress. Doctor ratings of anxious neurotic patients. Archives of General Psychiatry, 21, 328-338.

Loeser, J.D. (1980). Low back pain. In J.J. Bonica (Ed.), Pain (pp. 363-377). New York: Raven Press.

Long, D.M. (1982). Surgery for pain. In H.J. Wain & D.P. Devaris (Eds.), The treatment of pain (pp. 41-50). New York: Jason Aronson.

Long, D.M., & Hagfors, N. (1975). Electrical stimulation in the nervous system: The current status of electrical stimulation of the nervous system for the relief of pain. Pain, 1, 109-124.

Lovallo, W. (1975). The cold pressor test and autonomic function: A review and integration. Psycho-physiology, 12, 268-283.

Love, A.W., & Peck, C.L. (1987). The MMPI and psychological factors in chronic low back pain: A review. Pain, 28, 1-12.

Luborsky, L., & McLellan, A.T. (1981). A sound mind in a sound body: To what extent do they go together before and after psychotherapy? International Journal of Psychiatric Medicine, 10, 123-133.

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

Mahoney, M.J. (1974). Cognition and behavior modification. Cambridge, MA: Ballinger.

Maruta, T., & Osborne, D. (1978). Sexual activity in chronic pain patients. Psychosomatics, 19, 531-537.

Maruta, T., Swanson, D.W., & Swenson, W.M. (1979). Chronic pain: Which patients may a pain-management program help? Pain, 7, 321-329.

Meichenbaum, D.H. (1977). Cognitive-behavior modification: An integrative approach. New York: Plenum.

Meichenbaum, D.H. (1985). Stress inoculation training. New York: Pergamon Press.

Meichenbaum, D.H., & Jaremko, M.E. (Eds.). (1982). Stress prevention and management: A cognitive-behavioral approach. New York: Plenum.

Meichenbaum, D.H., & Turk, D.C. (1976). The cognitive-behavioral management of anxiety, anger and pain. In P.D. Davidson (Ed.), The behavioral management of anxiety, depression and pain (pp. 1-33). New York: Brunner/Mazel.

Meichenbaum, D.H., & Turk, D.C. (1982). Stress, coping and disease: A cognitive behavioral perspective. In R.W.J. Neufeld (Ed.), Psychological stress and psychopathology (pp. 289-305). New York: McGraw-Hill.

Meilman, P.W., Guck, T.P., Skultety, F.M., Robbins, D.E., & Jensen, K. (1986). Changes in psychopathology associated with multidisciplinary pain treatment. The Clinical Journal of Pain, 2(2), 107-113.

Melzack, R. (1975). The McGill Pain Questionnaire: Major properties and scoring methods. Pain, 1, 277-299.

Melzack, R., & Perry, C. (1975). Self-regulation of pain: The use of alpha-feedback and hypnotic training for the control of chronic pain. Experimental Neurology, 46, 452-469.

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

Miller, P.J. (1985). Assessment of joint motion. Clinics in Physical Therapy, 7, 103-136.

Mitchell, K.R., & White, R.G. (1977). Behavioral self-management: An application to the problem of migraine headaches. Behavior Therapy, 8, 213-221.

Moore, J.E., & Chaney, E.F. (1985). Outpatient group treatment of chronic pain: Effects of spouse involvement. Journal of Consulting and Clinical Psychology, 53(3), 326-334.

Moore, M.E., Berk, S.N., & Nypaver, A. (1984). Chronic pain: Inpatient treatment with small group effects. Archives of Physical and Medical Rehabilitation, 65, 356-361.

Nachemson, A. (1979). A critical look at the treatment for low back pain. Scandinavian Journal of Rehabilitation Medicine, 11, 143-149.

Naliboff, B.D., Cohen, M.J., Swanson, G.A., Bonebakker, A.D., & MacArthur, D.L. (1985). Comprehensive assessment of chronic low back pain patients and controls: Physical abilities, level of activity, psychological adjustment and pain perception. Pain, 23, 121-134.

Neufeld, R.W.J. (1970). The effect of experimentally altered cognitive appraisal on pain tolerance. Psychonomic Science, 20, 106-107.

Nouwen, A., & Bush, C. (1984). The relationship between paraspinal EMG and chronic low back pain. Pain, 20, 109-123.

Nunnally, J. (1970). Introduction to psychological measurement. New York: McGraw-Hill.

O'Leary, D.K., & Wilson, T.G. (1987). Behavior therapy: Application and outcome (2nd ed.). New York: Prentice-Hall.

Paulley, J.W., & Haskell, D.J. (1975). Treatment of migraine without drugs. Journal of Psychosomatic Research, 19, 367-374.

Payne, B., & Norfleet, M.A. (1986). Chronic pain and the family: A review. Pain, 26, 1-22.

Pearce, S. (1983). A review of cognitive-behavioural methods for the treatment of chronic pain. Journal of Psychosomatic Research, 27(5), 431-440.

Pelletier, K.R., & Peper, E. (1977). Developing a biofeedback model: Alpha EEG feedback as a means for pain control. International Journal of Clinical and Experimental Hypnosis, 25, 361-371.

Pilowsky, I., & Spence, N.D. (1975). Patterns of illness behaviour in patients with intractable pain. Journal of Psychosomatic Research, 19, 279-287.

Pilowsky, I., & Spence, N.D. (1976). Pain and illness behaviour: A comparative study. Journal of Psychosomatic Research, 20, 131-134.

Ready, L.B., Sarkis, E., & Turner, J.A. (1982). Self-reported vs. actual use of medications in chronic pain patients. Pain, 12, 285-294.

Reich, J., Rosenblatt, R.M, & Tupin, J. (1983). DSM III: A new nomenclature for classifying patients with chronic pain. Pain, 16, 201-206.

Rickels, K., Lipman, R.S., Garcia, C.R., & Fisher, E. (1972). Evaluating clinical improvement in anxious outpatients, A comparison of normal and treated neurotic patients. American Journal of Psychiatry, 128, 119-123.

Roberts, A.H., & Reinhardt, L. (1980). The behavioral management of chronic pain: Long-term follow-up with comparison groups. Pain, 8, 151-162.

Romano, J.M., & Turner, J.A. (1985). Chronic pain and depression: A review. Psychological Bulletin, 97, 18-34.

Rosenstiel, A.K., & Keefe, F.J. (1983). The use of coping strategies in chronic low back pain patients: Relationship to patient characteristics and current adjustment. Pain, 17(1), 33-44.

Rowat, K.M., & Knafl, K.A. (1985). Living with chronic pain: The spouse's perspective. Pain, 23, 259-271.

Roy, R. (1982). Marital and family issues in patients with chronic pain. Psychotherapy and Psychosomatics, 37, 1-12.

Roy, R. (1986). Measurement of chronic pain in the pain-depression literature during the 1980's: A review. International Journal of Psychiatry in Medicine, 16(2), 179-188.

Rybstein-Blinchik, E. (1979). Effects of different cognitive strategies on chronic pain experience. Journal of Behavioral Medicine, 2(1), 93-101.

Sanders, S.H. (1983). Component analysis of a behavioral treatment program for chronic low-back pain. Behavior Therapy, 14, 697-705.

Schmidt, A.J.M. (1985). Cognitive factors in the performance level of chronic low back pain patients. Journal of Psychosomatic Research, 29(2), 183-189.

Scott, D.S., & Barber, T.X. (1977). Cognitive control of pain: Effects of multiple cognitive strategies. Psychological Record, 27, 373-383.

Shanfield, S.B., Heiman, E.M., Cope, D.N., & Jones, J.R. (1979). Pain and the marital relationship: Psychiatric distress. Pain, 7, 343-351.

Skevington, S.M. (1983). Activities as indices of illness behavior in chronic pain. Pain, 15, 295-307.

Smith, G.M., Egbert, L., Markowitz, R., Mosteller, F., & Beecher, H.K. (1966). An experimental pain method sensitive to morphine in man: The submaximum effort tourniquet technique. Journal of Pharmacology and Experimental Therapeutics, 145, 324-332.

Smith, T.W., Aberger, E.W., Follick, M.J., & Ahern, D.K. (1986). Cognitive distortion and psychological distress in chronic low back pain. Journal of Consulting and Clinical Psychology, 54(4), 573-575.

Swanson, D.W., & Maruta, T. (1980). Patients complaining of extreme pain. Mayo Clinic Proceedings, 55, 563-566.

Turk, D.C. (1978). Cognitive-behavioral techniques in the management of pain. In J.P. Foreyt & D.P. Rathjen (Eds.), Cognitive behavior therapy: Research and application (pp. 199-232). New York: Plenum.

Turk, D.C., & Flor, H. (1984). Etiological theories and treatments for chronic back pain: II. Psychological models and interventions. Pain, 19, 209-233.

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

Turk, D.C., Wack, J.T., & Kerns, R.D. (1985). An empirical examination of the "pain-behavior" construct. Journal of Behavioral Medicine, 8(2), 119-130.

Turner, J.A. (1982). Comparison of group progressive relaxation training and cognitive behavioral group therapy for chronic low back pain. Journal of Consulting and Clinical Psychology, 50(5), 757-765.

Turner, J.A., & Chapman, C.R. (1982). Psychological interventions for chronic pain: A critical review: I. Relaxation training and biofeedback. Pain, 12, 1-21.

Uhlenhuth, E.H. (1975). Evaluation of behavior change and therapeutic effectiveness. In D.X. Freedman & J.E. Dyrud (Eds.), American handbook of psychiatry (pp. 938-954). New York: Basic Books.

Uhlenhuth, E.H., Rickels, K., Fisher, S., Park, L.C., Lipman, R.S., & Mock, J. (1966). Drug, doctor's verbal attitude and clinic setting in the symptomatic response to pharmacotherapy. Psychopharmacologia, 9, 392-418.

Weissman, M.M. (1975). The assessment of social adjustment: A review of techniques. Archives of General Psychiatry, 32, 357-365.

Wells, J.K., Howard, G.S., Nowlin, W.F., & Vargas, M.J. (1986). Presurgical anxiety and postsurgical pain and adjustment: Effects of a stress inoculation procedure. Journal of Consulting and Clinical Psychology, 54(6), 831-835.

Wernick, R.L., Jaremko, M.E., & Taylor, P.W. (1981). Pain management in severely burned adults: A test of stress inoculation. Journal of Behavioral Medicine, 4, 103-109.

Winer, B.J. (1971). Statistical principles in experimental design (2nd ed.). New York: McGraw-Hill.

Appendix A

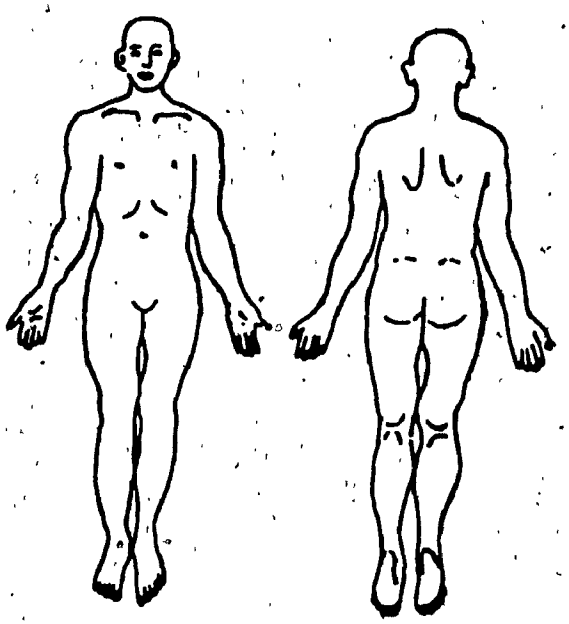
McGill Pain Questionnaire

Patient's Name _____ Date _____

In the boxes numbered 1-20 are words which describe pain. Choose only the words that best describe your present pain. Leave out any category that is not suitable. Select only one word from each appropriate category.

1	FLICKERING	11	TIRING
	QUIVERING		EXHAUSTING
	PULSING	12	SICKENING
	THROBBING		SUFFOCATING
	BEATING	13	FEARFUL
	POUNDING		FRIGHTFUL
2	JUMPING		TERRIFYING
	FLASHING	14	PUNISHING
	SHOOTING		GRUELLING
3	PRICKING		CRUEL
	BORING		VICIOUS
	DRILLING		KILLING
	STABBING	15	WRETCHED
	LANCINATING		BLINDING
4	SHARP	16	ANNOYING
	CUTTING		TROUBLESOME
	LACERATING		MISERABLE
5	PINCHING		INTENSE
	PRESSING		UNBEARABLE
	GNAWING	17	SPREADING
	CRAMPING		RADIATING
	CRUSHING		PENETRATING
6	TUGGING		PIERCING
	PULLING	18	TIGHT
	WRENCHING		NUMB
7	HOT		DRAWING
	BURNING		SQUEEZING
	SCALDING		TEARING
	SEARING	19	COOL
8	TINGLING		COLD
	ITCHY		FREEZING
	SMARTING	20	NAGGING
	STINGING		MAUSEATING
9	DULL		AGONIZING
	SORE		DREADFUL
	HURTING		TORTURING
	ACHING		
	HEAVY		
10	TENDER		
	TAUT		
	RASPING		
	SPLITTING		

Please mark on the drawing the areas where you feel pain. Near the areas which you have marked, put an 'E' if pain is external, or 'I' if internal. Put 'EI' if pain is both external and internal.



Which word would you use to describe your pain:

constant_____ periodic_____ or brief_____

Which word describes your pain right now.

0	No pain	___
1	Mild	___
2	Discomforting	___
3	Distressing	___
4	Horrible	___
5	Excruciating	___

Appendix B

Hopkins Symptom Checklist

INSTRUCTIONS: Below is a list of problems and complaints that people sometimes have. Please read each one carefully. After you have done so, please darken one of the four spaces to the right that best describes HOW MUCH THAT PROBLEM HAS BOTHERED OR DISTRESSED YOU DURING THE PAST WEEK, INCLUDING TODAY.

Mark only one space for each problem and do not skip any items. Make your marks carefully. If you change your mind, erase your first mark completely.

	Not at all 1	A little 2	Quite a bit 3	Extremely 4
1. Headaches	___	___	___	___
2. Nervousness or shakiness inside	___	___	___	___
3. Being unable to get rid of bad thoughts or ideas	___	___	___	___
4. Faintness or dizziness	___	___	___	___
5. Loss of sexual interest or pleasure	___	___	___	___
6. Feeling critical of others	___	___	___	___
7. Bad dreams	___	___	___	___
8. Difficulty in speaking when you are excited	___	___	___	___
9. Trouble remembering things	___	___	___	___
10. Worried about sloppiness or carelessness	___	___	___	___
11. Feeling easily annoyed or irritated	___	___	___	___

Hopkins Symptom Checklist continued

	Not at all 1	A little 2	Quite a bit 3	Extremely 4
12. Pains in the heart or chest	___	___	___	___
13. Itching	___	___	___	___
14. Feeling low in energy or slowed down	___	___	___	___
15. Thoughts of ending your your life	___	___	___	___
16. Sweating	___	___	___	___
17. Trembling	___	___	___	___
18. Feeling confused	___	___	___	___
19. Poor appetite	___	___	___	___
20. Crying easily	___	___	___	___
21. Feeling shy or uneasy with the opposite sex	___	___	___	___
22. A feeling of being trapped or caught	___	___	___	___
23. Suddenly scared for no reason	___	___	___	___
24. Temper outbursts you could not control	___	___	___	___
25. Constipation	___	___	___	___
26. Blaming yourself for things	___	___	___	___
27. Pains in the lower part of your back	___	___	___	___
28. Feeling blocked or stymied in getting things done	___	___	___	___
29. Feeling lonely	___	___	___	___

Hopkins Symptom Checklist continued

	Not at all 1	A little 2	Quite a bit 3	Extremely 4
30. Feeling blue				
31. Worrying or stewing about things				
32. Feeling no interest in things				
33. Feeling fearful				
34. Your feelings being easily hurt				
35. Having to ask others what you should do				
36. Feeling others do not understand you or are unsympathetic				
37. Feeling that people are unfriendly or dislike you				
38. Having to do things very slowly in order to be sure you are doing them right				
39. Heart pounding or racing				
40. Nausea or upset stomach				
41. Feeling inferior to others				
42. Soreness of your muscles				
43. Loose bowel movements				
44. Difficulty in falling asleep or staying asleep				
45. Having to check and double-check what you do				
46. Difficulty making decisions				

Hopkins Symptom Checklist continued

	Not at all 1	A little 2	Quite a bit 3	Extremely 4
47. Wanting to be alone	—	—	—	—
48. Trouble getting your breath	—	—	—	—
49. Hot or cold spells	—	—	—	—
50. Having to avoid certain places or activities because they frighten you	—	—	—	—
51. Your mind going blank	—	—	—	—
52. Numbness or tingling in parts of your body	—	—	—	—
53. A lump in your throat	—	—	—	—
54. Feeling hopeless about the future	—	—	—	—
55. Trouble concentrating	—	—	—	—
56. Weakness in parts of your body	—	—	—	—
57. Feeling tense or keyed up	—	—	—	—
58. Heavy feelings in your arms or legs	—	—	—	—

Appendix C

Katz Social Adjustment Scales

Patient's Booklet

Before administering the separate inventories, the examiner should paraphrase the following: The forms which you are asked to fill out are designed to give us some idea of how well you are feeling from day to day and the kinds of things you are doing now.

Form S2: Level of Performance of Socially-Expected Activities (Performance Scale)

Instructions to the patient: People differ in what they are able to do. I want you to go through this list and tell me which of these things you are doing now. For example, if you are regularly helping with household chores, then you would place a check in column (3). If you are helping some, then you would check column (2). If you are not doing this, then you would place a check in column (1).

Form RS4: Level of Free-Time Activities (Frequency Scale).

Instructions to the patient: What do you do with your free time? I want you to go through this list and tell me which of these things you are now doing. For example, if you frequently work in and around the house, place a check in column (1). If you do this sometimes, check column (2). If you never, or almost never do this, place a check in column (3). Be sure and put a check in one of the columns after each item.

KAS FORM S2

	am not doing 1	am doing some 2	am doing regularly 3	does not apply 4
1. Help with household chores				
2. Visit friends				
3. Visit relatives				
4. Entertain friends at home				
5. Dress and take care of myself				
6. Help with the family budgeting				
7. Remember to do important things on time				
8. Get along with family members				
9. Go to parties and other social activities				
10. Get along with neighbors				
11. Help with family shopping				
12. Help in the care and training of children				
13. Go to church				
14. Take up hobbies				
15. Work				
16. Support the family				

KAS FORM RS4

	frequently 1	sometimes 2	practically never 3	does not apply 4
1. Work in and around the house	___	___	___	___
2. Work in the garden or yard	___	___	___	___
3. Work on some hobby	___	___	___	___
4. Listen to the radio	___	___	___	___
5. Watch television	___	___	___	___
6. Write letters	___	___	___	___
7. Go to the movies	___	___	___	___
8. Attend lectures, theatre	___	___	___	___
9. Attend club, lodge, other meetings	___	___	___	___
10. Shop	___	___	___	___
11. Take part in community or church work	___	___	___	___
12. Bowl or other sports	___	___	___	___
13. Play cards or other table games	___	___	___	___
14. Take rides	___	___	___	___
15. Visit friends	___	___	___	___
16. Entertain friends	___	___	___	___
17. Sew, crochet or knit	___	___	___	___
18. Read	___	___	___	___
19. Go to the library	___	___	___	___

KAS FORM RS4 continued

	frequently 1	sometimes 2	practically never 3	does not apply 4
20. Just sit and think	___	___	___	___
21. Take courses at home	___	___	___	___
22. Go to school	___	___	___	___
23. Other (what?)_____	___	___	___	___

Appendix D

Katz Social Adjustment Scales

Relative's Booklet

Preliminary to the administration of the separate inventories, the examiner should paraphrase the following to the relative: The forms which I shall ask you to fill out are designed to give us some idea of how _____ is from day to day, his/her behavior, and how he/she gets along with other people. It will give us some idea of what he/she is doing and how well he/she is getting along now.

Form R2: Level of Performance of Socially-Expected Activities (Performance Scale)

Instructions to the relative: People differ in what they are able to do. I would like you to do through this list and tell me which of these things he/she is doing now. For example, if he/she is not helping with the household chores you would place a check in column (1). If he/she helps some, then you would check column (2). If he/she is doing this regularly, then place a check in column (3).

Form RS4: Level of Free-Time Activities (Frequency Scale)

Instructions to the relative: What does he/she do with his/her free time? I want you to go through this list and tell me which of these things he/she is now doing. For example, if he/she frequently works in and around the house, place a check in column (1). If he/she does this sometimes, check column (2). If he/she never, or almost never, does it place a check in column (3). Be sure and put a check in one of the columns after each item.

KAS FORM S2

	is not doing 1	is doing some 2	is doing regularly 3	does not apply 4
1. Helps with household chores	___	___	___	___
2. Visits his/her friends	___	___	___	___
3. Visits his/her relatives	___	___	___	___
4. Entertains friends at home	___	___	___	___
5. Dresses and takes care of himself/herself	___	___	___	___
6. Helps with the family budgeting	___	___	___	___
7. Remembers to do important things on time	___	___	___	___
8. Gets along with family members	___	___	___	___
9. Goes to parties and other social activities	___	___	___	___
10. Gets along with neighbors	___	___	___	___
11. Helps with family shopping	___	___	___	___
12. Helps in the care and training of children	___	___	___	___
13. Goes to church	___	___	___	___
14. Takes up hobbies	___	___	___	___
15. Works	___	___	___	___
16. Supports the family	___	___	___	___

KAS FORM RS4

	frequently 1	sometimes 2	practically never 3	does not apply 4
1. Works in and around the house	___	___	___	___
2. Works in the garden or yard	___	___	___	___
3. Works on some hobby	___	___	___	___
4. Listens to the radio	___	___	___	___
5. Watches television	___	___	___	___
6. Writes letters	___	___	___	___
7. Goes to the movies	___	___	___	___
8. Attends lectures, theatre	___	___	___	___
9. Attends club, lodge, other meetings	___	___	___	___
10. Shops	___	___	___	___
11. Takes part in community or church work	___	___	___	___
12. Bowls or other sports	___	___	___	___
13. Plays cards or other table games	___	___	___	___
14. Takes rides	___	___	___	___
15. Visits friends	___	___	___	___
16. Entertains friends	___	___	___	___
17. Sews, crochets or knits	___	___	___	___
18. Reads	___	___	___	___
19. Goes to the library	___	___	___	___

KAS FORM RS4 continued

	frequently 1	sometimes 2	practically never 3	does not apply 4
20. Just sits and thinks	___	___	___	___
21. Takes courses at home	___	___	___	___
22. Goes to school	___	___	___	___
23. Other (what?)_____	___	___	___	___

Appendix E

Patient Pain Record

Instruction Sheet for Patients

In the spaces provided at the top of each record, please put (a) your name; (b) the date; (c) the time you retired (went to bed to sleep) last night and got up (got out of bed to start your day) this morning; and (d) the exact amount of time in hours and minutes (e.g., four hours and 15 minutes) you spent with your husband/wife today between 8 am & 10 pm. Answer questions 1 - 3 for the period between 8 am & 10 pm today by circling one number on each of the 0 - 10 point rating scales. Question 4 refers to your sleep last night. The 24 numbers in question 5 represent hours during the past 24 hour period. Please complete each form in the evening at 10 pm, or as close to this time as possible. Be as accurate as you possibly can. Immediately after you have completed each record, please seal it in one of the envelopes provided by the therapist.

In order to ensure an independent evaluation, you should complete your records in private. Please do not discuss these questions or your responses to them with your spouse.

Patient Pain Record

Name: _____ Date: _____

Time retired last night: _____ Time got up this morning: _____

Indicate the exact amount of time between 8 am & 10 pm today that you spent with your husband/wife: _____ hours and _____ minutes.

---

1. When you were with your husband/wife today, how much of the time did you spend talking about your pain? Circle one number on the 0 - 10 point scale below.

   0 1 2 3 4 5 6 7 8 9 10
   No time All the time

2. Indicate the intensity of your pain today by circling one of the numbers on the scale below.

   0 1 2 3 4 5 6 7 8 9 10
   No pain Excruciating

3. Indicate the amount of interference in your activities today caused by your pain by circling one number on the scale below.

   0 1 2 3 4 5 6 7 8 9 10
   No interference Incapacitating

4. Indicate how much your pain interfered with your sleep (i.e., kept you from falling asleep or woke you up during the night) last night by circling one number on the scale below.

   0 1 2 3 4 5 6 7 8 9 10
   No interference Incapacitating

5. Indicate the total number of hours you experienced pain in the last 24 hours by circling one number on the scale below.

   In pain:

   0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 hours

6. Record <u>all</u> medication you have taken for your pain within this 24 hour period. Specify the strength and amount of each medication you took and the time you took each medication.

<u>Time</u>	<u>Type</u>	<u>Strength</u>	<u>Amount</u>	<u>Total</u>

Appendix F

Spouse Pain Record

Instruction Sheet for Spouses

In the spaces provided at the top of each record, please put your name, the date, and the exact amount of time in hours and minutes (e.g., four hours and 15 minutes) you spent with your husband/wife today between 8 am & 10 pm. Answer questions 1 - 3 for the period between 8 am & 10 pm today by circling one number on each of the 0 - 10 point rating scales. Please complete each form in the evening at 10 pm, or as close to this time as possible. Be as accurate as you possibly can. Immediately after you have completed each record, please seal it in one of the envelopes provided by the therapist.

In order to ensure an independent evaluation, you should complete your records in private. Please do not discuss these questions or your responses to them with your spouse.

Spouse Pain Record

Name: _____ Date: _____

Indicate the exact amount of time between 8 am & 10 pm today that you spent with your husband/wife: _____ hours and _____ minutes.

---

1. When you were with your husband/wife today, how much of the time did he/she spend talking about his/her pain? Circle one number on the 0 - 10 point scale below.

0	1	2	3	4	5	6	7	8	9	10
No time										All the time

2. When you were with your husband/wife today, how much of the time did you see behaviour which suggested that your husband/wife was experiencing pain (for example, posturing, limping, holding part of the body, grimacing, moaning, frequent change of position, etc.) Circle one number on the scale below.

0	1	2	3	4	5	6	7	8	9	10
No time										All the time

3. When you were with your husband/wife today, how much interference did you see in his/her activities caused by his/her pain? Circle one number on the scale below.

0	1	2	3	4	5	6	7	8	9	10
No interference										Incapacitating

Appendix G

Pain Relief Unit Treatment Program

Instructions to Hospital Staff

Patients who will be admitted to the Pain Relief Unit beginning _____ will receive a six week intensive behavior therapy program, a physiotherapy exercise program, and occupational therapy.

The behavior therapies in this program have been used in our unit since its inception, and are designed to reduce pain and associated difficulties. They include relaxation training, operant therapy, and cognitive behavior therapy. Patients will receive behavior therapy in a group three times a week, for 1 1/2 hours at each session. A group for spouses will also be held once a week.

In addition, treatment will include the following components:

1. Analgesic medication intake will be changed from p.r.n. to time-contingent administration and, except where contra-indicated on medical grounds, will be gradually eliminated.
2. Frequency and duration of daily rest periods for each patient will be prescribed on a time-contingent basis as a reinforcer to activity and will be gradually reduced. Patients should rest at the specified times regardless of how they feel and they should not rest at any other time.
3. Activity (e.g., physiotherapy exercises, O.T. assignments, walking and swimming, social and work-related activity) prescribed for each patient will be gradually increased.
4. Weekend activities will be structured with the patient and his/her spouse to ensure continued progress away from hospital.

Instructions to Hospital Staff, continued

5. Individualized treatment goals will be established with each patient. The intermediate daily and weekly steps required to achieve each goal will be defined. Patients will record their performance on a daily progress sheet.
6. Environmental factors which may be increasing the patient's pain behavior and disability will be identified, and modified. An important factor which may contribute to the maintenance of excess pain behavior and disability in many cases is attention from family and health care professionals to pain behavior and inadequate or inappropriate attention to well behaviors such as activity, autonomy, socialization, and expression of feelings unrelated to pain. Therefore, an important component of treatment is the provision of guidelines about how hospital staff and the patient's spouse should respond to the patient. The aim of these guidelines is to provide an environment for each patient which reinforces well behavior instead of pain behavior.

   All staff who are involved in this treatment program should therefore adhere consistently to these guidelines.

   A) Pain Behavior (e.g., grimacing, moaning, holding part of the body, complaining about pain, etc.)
      1. Break eye contact with the patient.
      2. Say and do nothing for a few seconds following the expression of pain behavior.

3. Ask the patient a specific question about another topic (e.g., feelings, work-related or relational issues, etc.).

The patient's thoughts and feelings associated with pain behavior are important and should be discussed (e.g., hypochondriacal or other anxiety, concern a goal is too demanding, etc.). Of course, as is the case with any other patient, appropriate medical attention should be given to pain behavior which you think may be indicative of illness.

B) Refusal to Participate

Failure to meet a goal or to attend an activity should also receive neutral non-attention. The behavior should be noted, but there should be no attention given in response to a failure. For example, if the patient is taking an unscheduled rest in bed, nurses should not approach the patient at that time. Staff should approach only when the patient resumes on an activity. Patients should be encouraged to attend all the activities in their program. As stated earlier, anxiety the patient might feel about participating in any aspect of the program (e.g., fear that physiotherapy exercises might cause harm) should be discussed, and reassurance given. If the patient refuses to attend an activity, however, the patient should not be given any further attention during the time the activity was scheduled.

Instructions to Hospital Staff continued

C) Well Behavior (e.g., exercise, socialization, expression of feelings unrelated to pain, etc.)

Staff should respond to all well behavior with positive attention (i.e., eye contact, smiling, conversation, encouragement and praise). Each patient should receive attention when he/she is engaging in a well behavior and should not receive attention when manifesting only pain behaviour. For optimal effectiveness, attention should be given immediately following the occurrence of a well behavior. For example if a patient leaves his/her room and begins to play ping pong, the nurse should immediately smile at the patient and give an encouraging nod. If the patient approaches staff to discuss feelings unrelated to pain at an inconvenient time, you should nevertheless react positively to the patient's approach and indicate when conversation would be possible. Staff should initiate conversation with each patient when he/she is engaging in a well behavior and should not do so when the patient is manifesting only pain behavior.

Appendix H

Consent Form

The Pain Relief Unit of the Allan Memorial Institute is conducting a research project to investigate the effectiveness of a comprehensive treatment program in reducing pain and pain-related difficulties for patients with chronic (benign) pain.

Each patient who agrees to participate in this research project will be admitted to the Allan Memorial Institute for a six-week treatment program or will receive treatment on an outpatient basis. One third of the participants will be required to undergo a waiting period of three months, after which they will receive the treatment program.

The treatment program you will receive includes behaviour therapy three times weekly on a group basis with a psychologist, and weekly physiotherapy sessions. Activity (e.g., walking, physiotherapy exercises) will be gradually increased and rest periods will be decreased. The program will also include change in and/or reduction of medication intake if this is considered to be appropriate by the treatment team. While in hospital, inpatients will also receive occupational therapy and daily meetings with nursing staff. Inpatients will stay in hospital during the week and will go home on weekends.

After six weeks of intensive treatment inpatients will be discharged from hospital. Both inpatients and outpatients will continue to meet with the psychologist once a week for a further period of four weeks. The purpose of these sessions will be to work on the maintenance and generalization of treatment gains. This is called 'relapse prevention training', and is an important component of treatment.

In order to evaluate the efficacy of treatment, all participants will be required to complete three questionnaires at the hospital and to keep records for two weekends at home (a) two weeks before treatment; (b) after six weeks of treatment; and (c) after four weeks of relapse prevention training. Patients who begin immediate inpatient or outpatient treatment will also be required to complete the assessment procedures a fourth time, three months following completion of relapse prevention training. Patients who wait three months before beginning treatment will be required to complete the assessment procedures three times only during the waiting period. All patients will also undergo a physiotherapy examination at each assessment point.

This treatment program necessitates the full participation of each patient's spouse. Spouses will be required to (a) complete two questionnaires at the hospital and to keep records for two weekends at home at the frequency described above for patients; and (b) attend six weekly treatment sessions with the psychologist and with other spouses. The purpose of these sessions is to provide spouses with information about chronic pain and its treatment, and to help you to deal with difficulties which result from your partner's pain.

All assessment and therapy procedures and their rationale will be fully explained to each patient and his/her spouse before they are implemented. Following treatment and follow-up, patients will be returned to the care of their referring physician. Although it is expected that patients and spouses who agree to participate in this research project have understood the requirements and will complete them, you may withdraw from the program without prejudice.

I hereby certify that I, _____,
have read and understood the foregoing, and that I agree freely and without constraint to participate in the research described above. I hereby agree to participate fully in all the assessment and therapy procedures outlined above. I understand that I may either (a) be admitted to hospital for therapy; or, (b) be treated on an out-patient basis; or, (c) be required to wait three months before I receive treatment. I understand that if I am assigned to wait three months I will also be required to complete all the assessment procedures described above during the waiting period, and I hereby agree to fulfill these requirements. I understand that if I am required to wait three months I will be offered the treatment program immediately following this period.

I have been given the right to ask questions, and have received answers to any inquiry concerning the foregoing. Questions, if any, have been answered to my satisfaction.

Signature of Patient: _____

Signature of Investigator: _____

I hereby certify that I, _____, have read and understood the foregoing, and that I agree freely and without constraint to participate in the research described above. I hereby agree to participate fully in all the assessment and therapy procedures outlined above. I understand that my husband/wife may either (a) be admitted to hospital for therapy; or, (b) be treated on an outpatient basis; or, (c) be required to wait three months before he/she receives treatment. I understand that if my husband/wife is assigned to wait three months I will also be required to complete all the assessment procedures described above during the waiting period, and I hereby agree to fulfill these requirements. I understand that if my husband/wife is required to wait three months he/she will be offered the treatment program immediately following this period.

I have been given the right to ask questions, and have received answers to any inquiry concerning the foregoing. Questions, if any, have been answered to my satisfaction.

Signature of Spouse: _____

Signature of Investigator: _____

Appendix I

Analysis of Variance Summary Tables

Patient Data

Table I-1

Analyses of Variance (Group x Sex) on the Sample Characteristics

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group df=2,35	Age	3.59	96.09	.04	ns
	Onset of Illness	.17	84.48	.00	ns
	Duration of Illness	4.34	62.03	.07	ns
	Number of Surgeries	.04	.58	.07	ns
	Years of Education	1.84	3.05	.60	ns
	Socioeconomic Index	1.76	170.49	.01	ns
Sex df=1,35	Age	189.53	96.09	1.97	ns
	Onset of Illness	304.28	84.48	3.60	ns
	Duration of Illness	13.52	62.03	.22	ns
	Number of Surgeries	1.11	.58	1.93	ns
	Years of Education	1.42	3.05	.47	ns
	Socioeconomic Index	243.53	170.49	1.43	ns
Group x Sex df=2,35	Age	.96	96.09	.01	ns
	Onset of Illness	2.25	84.48	.03	ns
	Duration of Illness	3.19	62.03	.05	ns
	Number of Surgeries	.28	.58	.48	ns
	Years of Education	.81	3.05	.27	ns
	Socioeconomic Index	22.48	170.49	.13	ns

Table I-2

MANOVA and Univariate F-Tests on the Eight Dependent Measures at Pre-Treatment

Effect	Pillais Value	F	Hypothesis D.F.	Error D.F.	P
Group	.10	.21	16	64	ns

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group df=2,38	Pain Rating Index	.57	116.08	.00	ns
	Present Pain Intensity	1.49	1.13	1.33	ns
	Pain Record	.26	1.97	.13	ns
	Analgesic Medication	.16	3.81	.04	ns
	Range of Motion	.16	1.10	.14	ns
	Katz Performance Scale	.03	14.61	.00	ns
	Katz Frequency Scale	.53	22.97	.02	ns
	Hopkins Checklist	21.40	359.73	.06	ns

Table I-3

MANOVA (Group x Time) and Univariate F-Tests on the Eight Dependent Measures

Effect	Pillais Value	F	Hypothesis D.F.	Error D.F.	P
Group	.29	.69	16	64	ns
Time	.64	4.13	16	140	.0001
Group x Time	.69	1.86	32	288	.004

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group df=2,38	Pain Rating Index	826.50	336.95	2.45	ns
	Present Pain Intensity	6.96	2.43	2.86	ns
	Pain Record	13.22	8.52	1.55	ns
	Analgesic Medication	23.63	6.68	3.53	ns
	Range of Motion	.63	2.54	.25	ns
	Katz Performance Scale	23.40	31.87	.73	ns
	Katz Frequency Scale	40.71	44.46	.92	ns
	Hopkins Checklist	516.83	959.13	.54	ns

Table I-3 continued

MANOVA (Group x Time) and Univariate F-Tests on the Eight Dependent Measures

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Time df=2,76	Pain Rating Index	550.56	43.07	12.78	.001
	Present Pain Intensity	1.55	.58	2.65	ns
	Pain Record	1.19	.62	1.92	ns
	Analgesic Medication	6.95	1.21	5.76	.02
	Range of Motion	.35	.33	1.07	ns
	Katz Performance Scale	14.39	5.15	2.79	ns
	Katz Frequency Scale	26.91	7.30	3.69	ns
	Hopkins Checklist	2368.86	100.00	23.69	.001
Group x Time df=4,76	Pain Rating Index	236.83	43.07	5.50	.01
	Present Pain Intensity	2.88	.58	4.94	.01
	Pain Record	4.00	.62	6.45	.004
	Analgesic Medication	4.49	1.21	3.71	.03
	Range of Motion	.41	.33	1.25	ns
	Katz Performance Scale	6.44	5.14	1.25	ns
	Katz Frequency Scale	9.47	7.30	1.30	ns
	Hopkins Checklist	224.74	100.00	2.25	ns

Table I-4

MANOVA (Group x Time) and Univariate F-Tests on the Pain Measures for Treated Patients

Effect	Pillais Value	F	Hypothesis D.F.	Error D.F.	P
Group	.06	.40	4	24	ns
Time	.64	5.38	12	240	.0001
Group x Time	.18	1.26	12	240	ns

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group df=1,27	Pain Rating Index	235.56	454.49	.52	ns
	Present Pain Intensity	.28	3.91	.07	ns
	Pain Record	1.12	11.85	.09	ns
	Analgesic Medication	9.13	7.15	1.28	ns
Time df=3,81	Pain Rating Index	1017.28	48.72	20.88	.0001
	Present Pain Intensity	5.07	.61	8.37	.01
	Pain Record	9.09	.67	13.61	.001
	Analgesic Medication	13.15	1.23	10.68	.003

Table I-4 continued

MANOVA (Group x Time) and Univariate F-Tests on the Pain Measures for Treated Patients

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group x Time df=3,81	Pain Rating Index	68.06	48.72	1.40	ns
	Present Pain Intensity	2.20	.61	3.63	ns
	Pain Record	.72	.67	1.07	ns
	Analgesic Medication	1.08	1.23	.88	ns

Table I-5

MANOVA (Group x Time) and Univariate F-Tests on the Functional Measures for Treated Patients.

Effect	Pillais Value	F	Hypothesis D.F.	Error D.F.	P
Group	.08	.53	4	24	ns
Time	.50	4.07	12	240	.0001
Group x Time	.18	1.25	12	240	ns

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group df=1,27	Range of Motion	.12	3.42	.04	ns
	Katz Performance Scale	.33	48.77	.01	ns
	Katz Frequency Scale	94.20	68.52	1.37	ns
	Hopkins Checklist	107.10	1118.92	.10	ns
Time df=3,81	Range of Motion	.87	.35	2.49	ns.
	Katz Performance Scale	24.18	6.45	3.75	ns
	Katz Frequency Scale	10.31	8.46	1.22	ns
	Hopkins Checklist	2321.46	127.09	18.27	.001

Table I-5 continued

MANOVA (Group x Time) and Univariate F-Tests on the Functional Measures for Treated Patients

Univariate F-Tests					
Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group x Time df=3,81	Range of Motion	.49	.35	1.41	ns
	Katz Performance Scale	5.61	6.45	.87	ns
	Katz Frequency Scale	12.21	8.46	1.44	ns
	Hopkins Checklist	121.78	127.09	.96	ns

Table I-6

MANOVA (Group x Sex) and Univariate F-Tests on the Pain Measures at Pre-Treatment

Effect	Pillais Value	F	Hypothesis D.F.	Error D.F.	P
Group	.09	.38	8	66	ns
Sex	.07	.57	4	32	ns
Group x Sex	.08	.36	8	66	ns

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group df=2,35	Pain Rating Index	4.37	116.24	.04	ns
	Present Pain Intensity	1.41	1.21	1.16	ns
	Pain Record	.29	2.14	.14	ns
	Analgesic Medication	.72	3.96	.18	ns
Sex df=1,35	Pain Rating Index	120.79	116.24	1.04	ns
	Present Pain Intensity	.46	1.21	.38	ns
	Pain Record	.11	2.14	.05	ns
	Analgesic Medication	.77	3.96	.19	ns

Table I-6 continued

MANOVA (Group x Sex) and Univariate F-Tests and the Pain Measures at Pre-Treatment

Univariate F-Tests					
Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group x Sex df=2,35	Pain Rating Index	125.02	116.24	1.08	ns
	Present Pain Intensity	.01	1.21	.01	ns
	Pain Record	.02	2.14	.01	ns
	Analgesic Medication	2.43	3.96	.61	ns

Table I-7

MANOVA (Group x Sex) and Univariate F-Tests on the Functional Measures at Pre-Treatment

Effect	Pillais Value	F	Hypothesis D.F.	Error D.F.	P
Group	.05	.23	8	66	ns
Sex	.25	2.68	4	32	.05
Group x Sex	.21	.98	8	66	ns

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group df=2,35	Range of Motion	.37	.94	.40	ns
	Katz Performance Scale	1.80	15.01	.12	ns
	Katz Frequency Scale	2.01	24.11	.08	ns
	Hopkins Checklist	158.25	347.64	.46	ns
Sex df=1,35	Range of Motion	5.84	.94	6.23	.02
	Katz Performance Scale	10.07	15.01	.67	ns
	Katz Frequency Scale	.17	24.11	.01	ns
	Hopkins Checklist	486.36	347.64	1.40	ns

Table I-7 continued

MANOVA (Group x Sex) and Univariate F-Tests on the Functional Measures at Pre-Treatment

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group x Sex df=2,35	Range of Motion	1.85	.94	1.97	ns
	Katz Performance Scale	8.46	15.01	.56	ns
	Katz Frequency Scale	14.45	24.11	.60	ns
	Hopkins Checklist	443.20	347.64	1.27	ns

Table I-8

MANOVA (Group x Time x Sex) and Univariate F-Tests on the Pain Measures

Effect	Pillais Value	F	Hypothesis D.F.	Error D.F.	P
Group	.20	.93	8	66	ns
Time	.33	3.33	8	136	.002
Sex	.15	1.47	4	32	ns
Group x Time	.50	2.53	16	280	.001
Group x Sex	.09	.41	8	66	ns
Time x Sex	.13	1.16	8	136	ns
Group x Time x Sex	.19	.88	16	280	ns

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group df=2,35	Pain Rating Index	821.29	329.78	2.49	ns
	Present Pain Intensity	5.82	2.59	2.45	ns
	Pain Record	12.46	9.06	1.37	ns
	Analgesic Medication	23.76	7.08	3.35	.05
Time df=2,70	Pain Rating Index	425.08	41.64	10.21	.003
	Present Pain Intensity	1.14	.60	1.91	ns
	Pain Record	1.02	.61	1.67	ns
	Analgesic Medication	5.49	1.24	4.45	.04

Table I-8 continued

MANOVA (Group x Time x Sex) and Univariate F-Tests on the Pain Measures

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Sex df=1,35	Pain Rating Index	1069.75	329.78	3.24	ns
	Present Pain Intensity	.00	2.59	.00	ns
	Pain Record	1.23	9.06	.14	ns
	Analgesic Medication	.65	7.08	.09	ns
Group x Time df=4,70	Pain Rating Index	221.44	41.64	5.32	.01
	Present Pain Intensity	2.45	.60	4.12	.03
	Pain Record	3.63	.61	5.94	.01
	Analgesic Medication	4.09	1.24	3.31	.05
Group x Sex df=2,35	Pain Rating Index	140.03	329.78	.43	ns
	Present Pain Intensity	.94	2.59	.36	ns
	Pain Record	2.85	9.06	.31	ns
	Analgesic Medication	2.45	7.08	.35	ns
Time x Sex df=2,70	Pain Rating Index	133.93	41.64	3.22	ns
	Present Pain Intensity	.39	.60	.66	ns
	Pain Record	.71	.61	1.16	ns
	Analgesic Medication	.36	1.24	.29	ns

Table I-8 continued

MANOVA (Group x Time x Sex) and Univariate F-Tests on the Pain Measures

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group x Time x Sex df=4,70	Pain Rating Index	18.34	41.64	.44	ns
	Present Pain Intensity	.46	.60	.78	ns
	Pain Record	.77	.61	1.25	ns
	Analgesic Medication	1.08	1.24	.87	ns

Table I-9

MANOVA (Group x Time x Sex) and Univariate F-Tests on the Functional Measures

Effect	Pillais Value	F	Hypothesis D.F.	Error D.F.	P
Group	.13	.58	8	66	ns
Time	.48	5.39	8	136	.0001
Sex	.16	1.50	4	32	ns
Group x Time	.24	1.12	16	280	ns
Group x Sex	.22	1.04	8	66	ns
Time x Sex	.17	1.58	8	136	ns
Group x Time x Sex	.08	.38	16	280	ns

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group df=2,35	Range of Motion	1.11	2.28	.49	ns
	Katz Performance Scale	34.65	32.96	1.05	ns
	Katz Frequency Scale	31.28	46.51	.67	ns
	Hopkins Checklist	806.50	931.99	.87	ns

Table I-9 continued

MANOVA (Group x Time x Sex) and Univariate F-Tests on the Functional Measures

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Time df=2,70	Range of Motion	.65	.32	2.05	ns
	Katz Performance Scale	12.63	5.52	2.29	ns
	Katz Frequency Scale	25.98	7.59	3.42	ns
	Hopkins Checklist	2001.03	102.13	19.59	.001
Sex df=1,35	Range of Motion	6.91	2.28	3.02	ns
	Katz Performance Scale	24.45	32.96	.74	ns
	Katz Frequency Scale	7.06	46.51	.15	ns
	Hopkins Checklist	220.47	931.99	.24	ns
Group x Time df=4,70	Range of Motion	.94	.32	1.06	ns
	Katz Performance Scale	5.21	5.52	.94	ns
	Katz Frequency Scale	8.91	7.59	1.17	ns
	Hopkins Checklist	205.11	102.13	2.01	ns
Group x Sex df=2,35	Range of Motion	5.46	2.28	2.39	ns
	Katz Performance Scale	14.03	32.96	.43	ns
	Katz Frequency Scale	28.37	46.51	.61	ns
	Hopkins Checklist	1710.83	931.99	1.84	ns

Table I-9 continued

MANOVA (Group x Time x Sex) and Univariate F-Tests on the Functional Measures

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Time x Sex df=2,70	Range of Motion	.90	.32	2.81	ns
	Katz Performance Scale	.09	5.52	.02	ns
	Katz Frequency Scale	5.41	7.59	.71	ns
	Hopkins Checklist	188.79	102.13	1.85	ns
Group x Time x Sex df=4,70	Range of Motion	.14	.32	.44	ns
	Katz Performance Scale	1.21	5.52	.22	ns
	Katz Frequency Scale	3.13	7.59	.41	ns
	Hopkins Checklist	21.21	102.13	.21	ns

Appendix J

Analysis of Variance Summary Tables

Spouse Data

Table J-1

ANOVA on the Spousal Hopkins Symptom Checklist at Pre-Treatment

Source	Sum of Squares	D.F.	Mean Square	F	P
Group	10.04	2	5.02	.01	ns
Error	29941.57	38	787.94		

Table J-2

MANOVA and Univariate F-Tests on the Spousal Katz Scales and Pain Record at Pre-Treatment

Effect	Pillais Value	F	Hypothesis D.F.	Error D.F.	P
Group	.04	.22	6	74	ns

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group df=2,38	Katz Performance Scale	3.84	15.00	.26	ns
	Katz Frequency Scale	8.23	17.26	.48	ns
	Pain Record	.04	1.89	.02	ns

Table J-3

ANOVA (Group x Time) on the Spousal Hopkins Symptom Checklist

Source	Sum of Squares	D.F.	Mean Square	F	P
Group	703.64	2	351.82	.16	ns
Error	85160.30	38	2241.06		
Time	1151.72	2	575.86	4.22	.05
Group x Time	382.18	4	95.54	.70	ns
Error	10371.10	76	136.46		

Table J-4

MANOVA (Group x Time) and Univariate F-Tests on the Spousal Katz Scales and Pain Record

Effect	Pillais Value	F	Hypothesis D.F.	Error D.F.	P
Group	.21	1.42	6	74	ns
Time	.18	2.41	6	150	.03
Group x Time	.33	2.32	12	228	.008

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group df=2,38	Katz Performance Scale	56.54	30.35	1.86	ns
	Katz Frequency Scale	118.66	53,58	2.21	ns
	Pain Record	15.53	5.56	2.79	ns
Time df=2,76	Katz Performance Scale	15.60	4.14	3.77	ns
	Katz Frequency Scale	.60	5.23	.11	ns
	Pain Record	4.07	.83	4.90	.03
Group x Time df=4,76	Katz Performance Scale	9.43	4.14	2.28	ns
	Katz Frequency Scale	20.45	5.23	3.91	.03
	Pain Record	3.82	.83	4.59	.02

Table J-5

ANOVA (Group x Time) on the Hopkins Symptom Checklist for Spouses of Treated Patients

Source	Sum of Squares	D.F.	Mean Square	F	P
Group	523.11	1	523.11	.14	ns
Error	96858.85	26	3725.34		
Time	2494.58	3	831.53	4.90	.04
Group x Time	432.72	3	144.24	.85	ns
Error	13229.81	78	169.61		

Table J-6

MANOVA (Group x Time) and Univariate F-Tests on the Katz Scales and Pain Record for Spouses of Treated Patients

Effect	Pillais Value	F	Hypothesis D.F.	Error D.F.	P
Group	.09	.76	3	23	ns
Time	.48	4.77	9	225	.0001
Group x Time	.16	1.37	9	225	ns

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group df=1,25	Katz Performance Scale	9.75	40.49	.24	ns
	Katz Frequency Scale	28.71	69.66	.41	ns
	Pain Record	14.21	6.40	2.22	ns
Time df=3,75	Katz Performance Scale	42.00	5.95	7.06	.01
	Katz Frequency Scale	23.22	7.66	3.03	ns
	Pain Record	12.34	.81	15.31	.001
Group x Time df=3,75	Katz Performance Scale	5.12	5.95	.86	ns
	Katz Frequency Scale	12.16	7.66	1.59	ns
	Pain Record	2.22	.81	2.75	ns

Table J-7

ANOVA (Group x Sex) on the Spousal Hopkins Symptom CheckTist at Pre-Treatment-

Source	Sum of Squares	D.F.	Mean Square	F	P
Group	79.19	2	39.60	.05	ns
Sex	2674.31	1	2674.31	3.46	ns
Group x Sex	238.87	2	119.43	.16	ns
Error	27025.79	35	772.17		

Table J-8

MANOVA (Group x Sex) and Univariate F-Tests on the Spousal Katz Scales and Pain Record at Pre-Treatment

Effect	Pillais Value	F	Hypothesis D.F.	Error D.F.	P
Group	.70	.40	6	68	ns
Sex	.31	5.05	3	33	.005
Group x Sex	.10	.59	6	68	ns

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group df=2,35	Katz Performance Scale	5.77	16.03	.36	ns
	Katz Frequency Scale	6.73	15.40	.44	ns
	Pain Record	.46	1.86	.25	ns
Sex df=1,35	Katz Performance Scale	.53	16.03	.03	ns
	Katz Frequency Scale	108.17	15.40	7.04	.01
	Pain Record	4.32	1.86	2.32	ns
Group x Sex df=2,35	Katz Performance Scale	4.11	16.03	.26	ns
	Katz Frequency Scale	5.22	15.40	.34	ns
	Pain Record	.91	1.86	.50	ns

Table J-9

ANOVA (Group x Time x Sex) on the Spousal Hopkins Symptom Checklist

Source	Sum of Squares	D.F.	Mean Square	F	P
Group	925.34	2	462.66	.22	ns
Sex	9362.70	1	9362.70	4.38	.04
Group x Sex	1086.60	2	543.30	.25	ns
Error	74807.90	35	2137.39		
Time	1000.03	2	500.01	3.46	ns
Group x Time	315.11	4	78.78	.55	ns
Sex x Time	201.76	2	100.88	.70	ns
Group x Sex x Time	68.59	4	17.15	.12	ns
Error	10117.16	70	144.53		

Table J-10

MANOVA (Group x Time x Sex) and Univariate F-Tests on the Spousal Katz Scales and Pain Record

Effect	Pillais Value	F	Hypothesis D.F.	Error D.F.	P
Group	.24	1.52	6	68	ns
Time	.23	2.96	6	138	.009
Sex	.17	2.27	3	33	ns
Group x Time	.36	2.37	12	210	.007
Group x Sex	.04	.21	6	68	ns
Time x Sex	.10	1.24	6	138	ns
Group x Time x Sex	.21	1.34	12	210	ns

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Group df=2,35	Katz Performance Scale	63.20	32.01	1.97	ns
	Katz Frequency Scale	126.74	52.53	2.41	ns
	Pain Record	15.74	5.82	2.70	ns
Time df=2,70	Katz Performance Scale	16.53	4.21	3.93	ns
	Katz Frequency Scale	2.33	5.09	.46	ns
	Pain Record	5.36	.76	7.06	.01

Table J-10 continued

MANOVA (Group x Time x Sex) and Univariate F-Tests on the Spousal Katz Scales and Pain Record

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Sex df=1,35	Katz Performance Scale	2.45	32.01	.08	ns
	Katz Frequency Scale	164.33	52.53	3.13	ns
	Pain Record	7.30	5.82	1.25	ns
Group x Time df=4,70	Katz Performance Scale	9.34	4.21	2.22	ns
	Katz Frequency Scale	17.25	5.09	3.39	.05
	Pain Record	4.03	.76	5.30	.01
Group x Sex df=2,35	Katz Performance Scale	14.62	32.01	.46	ns
	Katz Frequency Scale	21.07	52.53	.40	ns
	Pain Record	.21	5.82	.04	ns

Table J-10 continued

MANOVA (Group x Time x Sex) and Univariate F-Tests on the Spousal Katz Scales and Pain Record

Univariate F-Tests

Effect	Variate	Hypothesis Mean Square	Error Mean Square	F	P
Time x Sex df=2,70	Katz Performance Scale	.34	4.21	.08	ns
	Katz Frequency Scale	7.47	5.09	1.47	ns
	Pain Record	1.61	.76	2.12	ns
Group x Time x Sex df=4,70	Katz Performance Scale	4.65	4.21	1.11	ns
	Katz Frequency Scale	6.33	5.09	1.24	ns
	Pain Record	1.52	.76	2.00	ns