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Maureen Walczyk

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THE INFLUENCE OF A COGNITIVE-BEHAVIORAL TREATMENT PROGRAM ON CHRONIC PAIN PATIENTS

By

Maureen Walczyk

A THESIS

Submitted to Michigan State University
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ABSTRACT

THE INFLUENCE OF A COGNITIVE-BEHAVIORAL TREATMENT PROGRAM ON CHRONIC PAIN PATIENTS

By

Maureen Walczyk

The purpose of this study was to determine the effect of a functional restoration program on the performance of chronic pain patients on the Global Severity Index (GSI) and somatization subscale (SOM) of the SCL-90-R. The study also sought to replicate subrgroups of chronic pain patients identified with the SCL-90-R in prior studies. Persons participating in an outpatient interdisciplinary cognitive-behavioral functional restoration program were administered the SCL-90-R prior to and following a seven week program. Retrospective analyses using non-parametric tests were conducted on 100 subjects to determine the influence of the treatment program on performance. A two-step cluster analysis was used to determine the presence of subgroups among the participants. The results showed that: 1) the treatment program was effective in significantly reducing the GSI score; 2) performance on six of nine SCL-90-R scale scores showed a significant improvement over time; 3) change on the SOM score from pre to post treatment exceeded the change on all scales except the DEP score; 4) change on the SOM score from pre to post-treatment was significantly greater than that of the PAR, PHO, and PSY scales; and 5) the cluster analyses for the entire group, and for men and women separately, each yielded three-cluster solutions, similar to those reported by Shutty an DeGood (1987) and Williams et al. (1995).

To my family

Dave, David, and Jordan,

for their love, understanding and support

To my parents

whose belief in hard work and

a solid education provided the foundation from

which I based my educational endeavors

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CHAPTER I

INTRODUCTION

Pain is a sensation that is experienced by all living beings at one time or another during their existence. Pain is a signal our body needs in order to survive. People with sudden or persistent pain routinely utilize the health care system. Professionals in the medical field are sought after to determine the cause of a patient's pain and to alleviate the noxious sensations the individual is experiencing.

Throughout history, pain has been viewed differently by various societies and cultures. Religious and emotional influences were thought to be responsible for the pain experiences of people. Headley (1991) provides examples of previously held views and theories of pain from an historical perspective. Ancient Egyptians believed that pain was inflicted upon them through spirits of the dead. People in India attributed pain to represent unfulfilled desires. Ancient Greeks were interested in the senses. Aristotle believed the heart to be the source of sensation and reason. He thought the heart constituted the *sensorium commune*. The Greeks believed that pain and pleasure were linked together, and that they were passions of the soul that originated from the heart (Bonica, 1990). Later, the Greeks began to shift their focus to the brain as being the center of the nervous system.

The Chinese population believed pain was the result of one's "yin and yang" being out of balance. The yin was considered to be the feminine,

negative/passive force and the yang was the masculine, positive/active force. When the yin and the yang were in balance, it was believed that the vital energy, the "chi" was able to circulate to all of the parts of the body through channels or meridians. If the chi circulated in too great or too little quantity, the yin and the yang would become out of balance and disease and pain would result (Bonica, 1990).

As medicine progressed so too did people's perspective of pain. Theories of pain developed and changed as discoveries were made of the human anatomy such as the circulation of blood and the discovery of the nervous system. The theories people held influenced the treatment approach undertaken by the care providers of that time. In order to start to understand pain, there must first be a clear definition if what pain is, and what are the various levels of pain are.

In order to start to understand pain, there must first be a clear definition of what pain is, and what are the various levels of pain are. The International Association for the Study of Pain (IASP); (1986) defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage." The definition points out that the experience of pain not only has sensory components, but emotional ones as well. The treatment of pain continues to prove challenging because two people with identical injuries may not experience the sensation of pain in the same manner. Pain itself can be defined on different levels based on the physiological condition of the process and the length of time that a person has been in pain.

Acute pain is defined as a signal associated with tissue damage or biological dysfunction. This pain will generally disappear once healing takes place (Chapman & Turner, 1990; Headley, 1991). *Chronic* pain is commonly defined as pain that lasts longer than six months. Some believe pain should be labeled chronic if it lasts longer than the expected healing time (Tollison, 1998; King & Goddard, 1994; Lynch, Kelly & Vasudevan, 1992; Vlaeyen, 1991). Headley (1991) reports, "patients with acute and chronic pain are differentiated by the degree to which these psychological reactions to pain exist, the duration of the psychological reaction, and the duration and extent of physiological adaptation responses" (p. 579).

It is necessary to assess psychological factors when attempting to evaluate a chronic pain problem. Mirabelli (1985) states that the pain experience is so complex that one must "include the physical perception of pain, suggestion, and the emotional state, expectations, personality, and cognitive view of the person experiencing it" (p. 600). The assessment of these areas is crucial for the successful treatment of chronic pain.

The mechanism of pain is a complex process. The experience of pain has been to found to have both sensory and emotional components (Wall & Melzack, 1994). When people experience pain, they not only have physiological responses, but psychological and behavioral reactions as well. The psychological reactions to pain usually disappear in patients with acute pain as the physical cause of their pain is resolved and they resume their normal life-style. Patients with chronic pain may no longer have ongoing tissue damage, yet

the pain still persists. Taub, Worsowicz, Gnatz, and Cifu (1998) describe a chronic pain syndrome as "an abnormal condition in which pain is no longer a symptom of tissue injury, but pain and pain behaviors become the primary disease process" (p. S-49). Moreover, specific foci of chronic pain appear to affect the probability of improvement in treatment. For example, the location of pain, the patient's age, and incentives to maintain pain behaviors for financial gain and disability payments may also affect treatment outcomes. The treatment of chronic pain becomes a challenge for the clinician because the patient no longer responds to traditional treatment approaches.

Medical professionals working with people in pain need to consider not only the physical signs and symptoms of the patient, but the patient's cognitive-emotional state as well. The patients may begin to magnify their symptoms in an attempt to convince the physician that a particular diagnosis exists. The patients do not willfully try to exaggerate the symptoms, but their report is influenced by the emotional nature of the pain. Anger, fear, and frustration can all act to increase symptom magnification (Chatfield, 1998). Treatment approaches need to encompass both the sensory component of pain as well as a variety of other factors.

Cultural, environmental and personality factors greatly impact one's response to pain. Headley (1991) writes, "the perpetuation of pain is now understood to include emotional, behavioral, and physiological components, which offer treatment-intervention possibilities targeting these multi-dimensional

aspects of pain" (p. 600). Patients with long-standing pain are fairly stressed both physically and mentally.

Stress can add to muscle tension, which in turn causes more pain. Increased pain can cause the muscles to tighten up and spasm. A pain-spasm-pain cycle becomes established and additional stress can work to continue this vicious cycle (Philips, 1988; Vlaeyen, 1991). Multiple sources of stress and anxiety can negatively impact a person's coping mechanism.

Texidor (1998) describes the importance of patients learning to manage their pain-anxiety cycles. He states "It is appropriate that individuals experiencing chronic pain become aware of the possible contributions they may inadvertently make to their pain by the automatic invocation of their stress response to any given stimuli or perception in the ensuing associated physiologic reactivity" (p. 5).

The pain-anxiety cycle is difficult for patients to break, especially without appropriate treatment intervention. Treatment for these individuals needs to include not only the physiology of the pain, but also the psychological, emotional, and sociological components that add to the pain. "Depression, anxiety, familial attitudes, motives of secondary gain, and the economic impact of the pain all must be investigated to better identify somatic and psychological aspects of pain" (p.19) (Warfield, 1990).

Schraeder (1996) focused on the mind/body link when a patient is faced with both psychological and physiological challenges. In her review of the literature on stress and immunity after traumatic injury, she reports, "serum

cortisol elevation occurs in many physically and emotionally stressful situations...changes are especially sensitive to stressful situations such as novelty, uncertainty, frustration, and conflict" (p. 354). The author encourages healthcare providers to allow patients to regain a sense of control through education as well as involving them in the decision making process. Schraeder reports that this will add to a patient's emotional and physiological well being.

The patients' environment and attitude can also have an effect on their perception of pain. Fordyce (1976) believes "...there are many complex social and interpersonal effects relating to a pain problem." If a person has negative attitudes, beliefs and expectations, the suffering from the pain experience will be increased.

Chronic pain can impact a person physically, socially, economically, behaviorally, and psychologically. Patients with chronic pain frequently report difficulty with employment, sleep, the ability to cope with stress, relationships, and finances (Williams & Richardson, 1993). Many patients with chronic pain limit their physical activity. Fordyce (1976) points out that "restricted activity leads to unemployment and to altered social and recreational patterns." Patients often avoid activities such as housework, recreation, exercise, intimacy, and work due to their complaints of pain (Philips, 1988). Coping strategies such as the use of imagery, relaxation, and distraction techniques can be taught to patients to help them feel more in control of their pain or at least of their reaction to it (Diamond & Coniam, 1997).

An interdisciplinary team approach to treatment that focuses on the cognitive and emotional aspects of pain along with functional restoration through physical work has been utilized with chronic pain patients. In this interdisciplinary approach, an interactive professional team provides simultaneous therapeutic services to reach a desired outcome (Texidor, 1998). Through their cooperative efforts, such a team can help the patient change physically, cognitively, and behaviorally.

A cognitive-behavioral approach to treatment assumes that individuals are active processors of information whose thoughts and behaviors can be influenced by both themselves and the environment. It assumes that people can learn more adaptive ways of thinking, feeling, and behaving by being an active participant in the process of change (Wall & Melzack, 1994). A functional restoration program based on a cognitive-behavioral perspective assists the patients with the physical treatment they need to help them return to function and provides them with the skills they need to form positive coping strategies related to the pain. The emphasis is to treat the "whole person" utilizing behavioral and cognitive approaches.

Behaviorally, the patients work towards daily physical goals. Rather than waiting for the pain to stop and then returning to functional activity, the patient is gradually returned physical activities. The program assists the patients physically by providing them with the opportunity to perform aerobic, stretching, and strengthening exercises. The patients utilize an exercise-quota system to help reverse patterns of inactivity. The patients start at their current functional

level and gradually move up in activity level on a graded, daily graph. They do not move ahead of their daily goal if they are having a "good day" and they do not move below their goal on a "bad day". The quota system allows the locus of control to shift back to the patients as they perform their pre-determined level of activity for the day instead of allowing the pain to dictate their activity for them.

The behavioral goal is to extinguish conditioned responses to the pain and to decrease overall pain behaviors such as limping, guarding, moaning, etc. Patients learn they can actually feel better with more activity without having increased pain or major setbacks.

Cognitive assistance is given by providing the patients with education and emotional support. Education is provided to the patients to assist them in their understanding of the chronic pain cycle. A functional restoration program teaches the patients how a body is adversely affected by avoidance behaviors and lack of activity. Patients are taught how other aspects of the pain, such as lack of sleep, stress/anxiety, limping /guarding, and negative self-talk all can contribute toward a downward spiral.

The emotional component of the program focuses on changing the patients' views of their pain and changing their emotional responses to the pain. The program psychologist, in both group and private sessions, performs the majority of the emotional retraining with the patients.

The goal of cognitive-behavioral approach to treatment is to help patients change the their emotional and behavioral response to the pain (Vlaeyen, 1991).

However, the effectiveness of this treatment approach with chronic pain patients is in need of further study.

A cognitive-behavioral treatment program may not be effective with all chronic pain because patients with chronic pain differ significantly in their reported symptoms of psychological distress (Shutty, & DeGood, 1987; Williams, Urban, Keefe, Shutty, and France, 1995; & Turk, Rudy, & Boucek, 1993). In addition, the nature and magnitude of symptoms reported by males are not identical to those reported by females (Shutty & DeGood, 1987; Williams et al., 1995). The differential impact of a cognitive-behavioral treatment program on males and females with chronic pain is not known and should be investigated.

Recent studies have shown that patients with chronic pain differ significantly in their reported symptoms of psychological distress. Investigators have been able to identify cluster groups of chronic pain patients (Shutty & DeGood, 1987; Williams et al., 1995; and Turk et al., 1993). For example, Williams et al. identified three cluster groups of chronic pain patients for both male and females. The subgroups reported low, medium, and high levels of distress based on responses scored in the standard manner of a standardized, psychological test called the Symptom Checklist –90-R (SCL-90-R).

Shutty & DeGood (1987) were also able to classify both male and female chronic pain patients into three cluster groups that represent low, moderate, and high distress groups, using the SCL-90-R. As in the Williams et al. (1995) study, the researchers found a stable three-cluster solution was most appropriate for

both males and females using standard scoring methods from a psychological test instrument.

Although various clusters of chronic pain patients have been found, researchers suggest that subgroups identified for chronic pain patients need to be replicated in other studies (Turk et al., 1993; Williams et al., 1995; Williams & Keefe, 1991). Moreover, the effects of treatment programs related to these clusters have yet to be studied. By identifying clusters of patients with different symptoms, health care providers can direct specific treatment interventions to the various distress groups. As Turk et al. (1993) suggest, "identifying clusters of patients according to physical, psychosocial, and behavioral data should enhance our understanding of pain, assist in the prescription of specific therapeutic interventions, and improve our ability to predict treatment outcome" (p. 50).

The purpose of the present study is to answer the questions that follow. What is the overall effect of a cognitive-behavioral treatment program on symptoms of psychological distress reported by chronic pain patients? Can a cognitive-behavioral treatment program affect one area of psychological symptoms related to chronic pain more significantly than other areas? Can clusters of chronic pain symptoms reported in the literature be replicated in the present study? Finally, to the extent that the data permit, what differential effects does a cognitive-behavioral treatment approach have on identified cluster groups within gender?

Statement of the Problem

This study was designed to determine the effects of a cognitive-behavioral functional restoration program on chronic pain patients who completed a seven-week treatment program at the Functional Recovery Program of Michigan.

Hypotheses

Three hypotheses will be tested in this investigation:

1. Chronic pain patients will demonstrate a significant decrease in the Global Severity Index (GSI) score on the Symptom Checklist 90-R (SCL-90R) from pre- to post-testing following the completion of a seven-week functional restoration program. The decrease in score will represent a lower overall self-reported intensity of perceived distress.

2. Chronic pain patients who completed the seven-week functional restoration program will report significantly more improvement on the somatization (SOM) scale of the SCL-90-R than on other scales of the SCL-90-R. The somatization scale most accurately reflects the level of a patient's distress arising from perceptions of bodily dysfunction. Therefore, this specific subscale will be most affected by the intervention.

3. Prior to treatment, three distinct groups will best characterize chronic pain patients replicating the three-cluster solution observed by Williams et al., (1995).

Need for the Study

The diagnosis and treatment of pain is one of the most costly health care issues in today's society (Tait, Chibnall, & Krause, 1990; Tollison, 1998). It has been estimated that the average cost to the national economy of disability related to chronic pain in the United States is 90 billion dollars (Ng, 1981 as cited in Tait et al., 1998). In individuals with chronic pain, psychological reaction to the pain becomes the problem. Thus, it is necessary to assess psychological factors when attempting to evaluate a chronic pain patient.

This study is concerned with outcome measures on the SCL-90-R of chronic pain patients after successfully completing a seven-week treatment program. The purpose of this study is to determine if a cognitive-behavioral approach to chronic pain has an impact on SCL-90-R scores after treatment. The score of particular interest is the Global Severity Index (GSI), which is the best indicator of the current level of an individual's psychological distress. Also, this study will attempt to identify and replicate subgroups of chronic pain patients, and the extent to which a functional restoration program impacts the SCL-90-R scores of the specific subgroups.

Results of this study may serve to guide future outcome-based research in the treatment of chronic pain patients. Health care workers may be better able to channel chronic pain patients into the most appropriate treatment based on their psychological profiles.

Scope of the Study

This retrospective study examines the effectiveness of a specific treatment program in reducing the intensity of perceived distress reported by the participants. It is limited to adult patients, 22 to 63 years of age, who successfully completed the Sinai-Grace Hospital's Functional Recovery Program of Michigan located in West Bloomfield, Michigan, during the time period of 1997-1999.

Limitation of the Study

This study will be subject to two limitations. First, the study only deals with chronic pain patients who have successfully completed a functional restoration program. It does not include those patients who dropped out and may have sought alternative treatment approaches. Secondly, the study only includes patients who are injured as a result of a work or auto related accident.

Definition of Terms

Acute Pain: An unpleasant signal associated with tissue damage or biological dysfunction. The pain will generally disappear once healing takes place (Chapman & Turner, 1990; Headley, 1991). For purposes of this study, acute pain will be referred to as pain that has lasted three months in duration or less.

Chronic Pain: Chronic pain is commonly defined as pain that lasts longer than six months. Some believe pain should be labeled chronic if it lasts longer than

the expected healing time (King & Goddard, 1994; Lynch et al., 1992; Vlaeyen, 1991). For purposes of this study, chronic pain will be referred to as pain that had lasted greater than three months in duration.

X-ray: A test that uses high-energy radiation to make images and pictures of the body to help diagnose fractures and diseases. An x-ray is a diagnostic test that physicians can use when trying to make a differential diagnosis with a patient in acute or chronic pain (available on-line at www.medicinenet.com under "tests and procedures").

Electromyogram (EMG) Test: A test of the intrinsic electrical properties of skeletal muscle by means of surface or needle electrodes. The test is used to determine if a muscle is contracting or not. An EMG is a diagnostic tool that physicians can use when trying to make a differential diagnosis with a patient in acute or chronic pain (available on-line at www.medicinenet.com under "tests and procedures").

Computerized Tomagraphy (CT) Scan: An x-ray procedure, which combines many x-ray images with the aid of a computer to generate cross-sectional views and three-dimensional images of the internal organs and structures of the body. A CT scan is a diagnostic test that physicians can use when trying to make a differential diagnosis with a patient in acute or chronic pain (available on-line at www.medicinenet.com under "tests and procedures").

Magnetic Resonance Imaging (MRI) Test: A radiology technique, which uses magnetism, radiowaves, and a computer to produce images of body structures. The image and resolution is detailed enough to detect tiny changes in structures within the body. A MRI is a diagnostic test that physicians can use when trying to make a differential diagnosis with a patient in acute or chronic pain (available on-line at www.medicinenet.com under "tests and procedures").

Myelogram: A picture produced of the spinal cord by the passage of x-rays through the body on specially sensitized film. A myelogram is a diagnostic test that physicians can use when trying to make a differential diagnosis with a patient in acute or chronic pain (available on-line at www.medicinenet.com under "tests and procedures").

CHAPTER II

REVIEW OF LITERATURE

The purpose of this study is to compare pre-treatment and post-treatment measures of the GSI and Somatization measures on the SCL-90-R following a functional restoration program. Also, the study will attempt to determine if subgroups of chronic pain patients can be identified and replicated as in prior studies.

The review of the literature for this study is divided into five sections: 1) physiological mechanisms of pain and the Gate Control Theory of Pain; 2) assessment and treatment of pain; 3) implications for health care workers; 4) a multidisciplinary approach to treatment; and, 5) subgroups of chronic pain patients.

Physiological Mechanisms of Pain and the Gate Control Theory of Pain

The mechanism of pain is a complex process. When an injury occurs, a complex series of biochemical and cellular events occur. The sensation of pain originates in receptors located throughout our body. The receptors send nerve signals to the spinal cord where specialized pain neurons send the information on to the brain. Not only does the cortex of the brain interpret that something painful has occurred, but a signal is simultaneously sent out to the body to withdraw, tense up or protect itself in whatever way seems appropriate (Sapolsky, 1994).

Many theories of pain have been proposed and modified throughout the years. Space does not permit a full discussion of the history of theories of pain. Readers interested in this topic are referred to Bonica (1990) and to Umphred's book (1985), where Mirabelli outlines various theories of pain.

The various theories are an attempt to explain some of the clinical aspects of pain, but all fall short of being considered a comprehensive, general theory for pain. Theories of pain that people hold often influence the treatment approach undertaken by care providers. For purposes of this study, the review of pain theory will be limited to the Gate Control Theory of pain.

While many of the previous theories have attempted to explain bits and pieces of the nature of pain, one theory developed in the mid-1960's has been widely accepted as a general explanation of pain circuits. The Gate Control Theory proposed by Wall and Melzack (1994) demonstrates the importance of both the central and peripheral nervous systems in the pain process. The theory proposes that ascending fibers that carry information about pain from the periphery to the spinal cord are not all one type. Sharp pains stimulate different nerves than dull, gnawing pains. A-delta fibers are myelinated fibers that carry sharp, stabbing pain. The myelinated fibers are able to transmit nerve impulses faster than unmyelinated fibers. A C-fiber is unmyelinated and carries slow, constant, and diffuse pain signals.

The sensation of pain originates in receptors located throughout the body called nocioreceptors. The receptors create and send nerve impulses to the spinal cord. There they are reprocessed and sent through open gates to the

thalamus, which in turn sends the information on to the cerebral cortex of the brain. Once the nerve signal reaches the brain, the information is processed and integrated with an individual's current mood, state of mind, and past experiences. All of this information together will influence the perception of the pain and guide one's response. The gate theory proposes that the interactions among sensory phenomena and cognitive-evaluative and motivational-affective factors create the experience of pain (Turk, Rudy, & Boucek, 1993). Pain thus becomes not only a sensory phenomenon, but a perceptual one as well.

As the pain impulses are transmitted to the brain; the brain sends impulses back to the body to help modulate the pain. This dual pathway allows sensory information to be modulated and can impact the amount of pain one perceives. The gate control theory holds that the substantia gelatinosa appears to be the site of the "gate" control within the spinal cord. Painful stimuli are transmitted to the spinal cord where modifications can result from either excitatory or inhibitory influences within the spinal cord and/or from descending influences from the brain. If the brain sends a signal back down to close the gate, the pain signals are blocked and we experience less pain (Sapolsky, 1994; Turk, 1993; Mirabelli, 1985; Vlaeyen, 1991).

Neurotransmitters and other chemicals in the nervous system can modulate the perception of pain by increasing or decreasing the pain in response to environmental factors or emotions. The gate control theory gained support with the discovery of receptors in the central nervous system for naturally occurring opioids in the body such as endorphins, enkephalins and substance P.

Electrical impulses are created in proportion to the sensation received, thus more pain means more impulse firing. If the brain sends a signal to open the gate wider, then the pain signal increases. Substance P is a neurotransmitter that signals pain. It causes sensitization of the C-fiber by causing the cell to release irritants such as histamine and serotonin, which increase the pain response, and heightens our awareness of pain. This sensitization can cause the pain signal to be transmitted with minimal stimulation.

The inhibitory message to blunt the perception of pain is carried by endorphins and enkephalins. These inhibitors are released by the brain, bind to receptors in the brain and spinal cord, and inhibit the opening of the gate. Enkephalins are molecules produced by the central nervous system to numb pain by inhibiting the production of Substance P. Endorphins help produce an analgesic effect and many sites correspond to the anatomical areas identified by Wall and Melzack (cited in Mirabelli, 1985). Certain events can decrease our endorphin levels such as pain, depression, interrupted sleep, and a lack of physical activity. Since endorphins give us our sense of well being, it is no wonder that the patient with chronic pain seems fixed in a downward spiral (Mirabelli, 1985; Warfield, 1990).

Assessment and Treatment of Pain

The medical assessment of pain often starts with a patient history, an exam by a physician, and a battery of diagnostic tests. The tests could include an x-ray, CAT scan, MRI, EMG, or a myleogram (please refer to the definitions of

terms inn Chapter I for a description of each test). Referrals to other medical specialists can be part of the assessment process as well. The medical work up is designed to determine the cause of a patient's pain so that the physician can best determine which method of treatment would be most appropriate.

Treatment can also take on a variety of forms. Prescription medication and bedrest may be sufficient to alleviate some types of pain. Other diagnoses may need physical or occupational therapy to help decrease the symptoms. When pain is localized to one small area, the physician can choose to utilize local steroid injections to decrease the inflammation. Pain that persists may be treated with nerve blocks, spinal epidural injections, or even with the placement of a spinal cord stimulator. These procedures become progressively more invasive. Sometimes it is determined that surgical intervention is necessary. Patients may also choose to turn away from traditional medical treatments and opt for alternative treatments such as acupuncture or herbal remedies. With the variety of treatment options available it is necessary that the physician consider not only the physical signs and symptoms of the patient, but the patient's cognitive-emotional state as well.

Implications for Health Care Workers

The health care system itself may perpetuate the problems of pain patients by the limits it places on them. Restrictions given to patients may lead to unemployment and reduced functioning in their daily activities. When people feel

they no longer can do things they enjoy or maintain their responsibilities, they may begin to feel emotional stress.

Bonica (1990) points out that, "In most cases, apprehension, fear, worry, anxiety – all mental effects of the pain – seems to have as much to do with the physical deterioration of the patient as does the pain itself...(p.18)". The person may feel isolated, uncertain, out of control and have observable pain behaviors. Pain behaviors refer to an "observable communication of pain and suffering" (Vlaeyen, 1991). The behaviors are commonly in the form of motor responses such as limping or restricting the use of a body part (Hinnant, 1994). One reason patients may develop illness behaviors is because "disability is an element of a chronic pain syndrome that may be perceived by patients as less stigmatizing than acknowledgement of psychological distress" (p. 192) (Deshields, Taid, Gfeller, & Chibnall, 1995).

The challenge physicians face when dealing with chronic pain patients is to delineate between what needs to be treated medically and what symptoms need to be treated with assistance from other health care providers. Once the primary injury has been treated, clinicians need to recognize and respond to the secondary effects of injury such as limping, guarding, dysfunctional movement patterns, and increased pain behaviors. Movement patterns need to be normalized in order to prevent shortening and changes in muscle and soft tissues, which may lead to more pain. There is a link between physical and psychosocial stress on a body that needs to be taken into consideration as well.

A Multidisciplinary Approach to Treatment

Patients with long-standing pain are fairly stressed both physically and mentally. Linton (2000) performed an extensive review of the literature on psychological variables in the etiology and development of neck and back pain. The author had various conclusions based on his evaluation of the studies. He concluded that psychological variables are clearly linked to the transition from acute to chronic pain; cognitive factors (attitudes, cognitive style, fear-avoidance beliefs) are related to pain and disability; and depression, anxiety, distress, and related emotions are related to pain and disability. A treatment approach that encompasses the multitude of factors related to chronic pain would be most affective.

When patients have been in long-standing pain, they no longer feel in control of their body or current situation. According to Diamond and Coniam (1997), the main objectives in treating chronic pain are "to increase self-perceived control over pain, to increase self-perceived independence, to increase levels of physical and social activity, and to reduce levels of emotional distress" (p. 159). With chronic pain, patients often lack understanding as to the source of their pain. They fear that they may be suffering from a severe pathology if health care workers cannot give a thorough rationale for the pain they are experiencing.

Geisser and Roth (1998) performed a study that focused on whether or not patients with chronic neck and back pain were able to identify the physiologic source of their pain. Patients were placed in three groups depending on their responses. One group was unsure of the cause of their pain. The second group

did know the cause of their pain, and they agreed with the clinical diagnosis given to them by the physician. The third group identified a cause of their pain that differed from their clinical diagnosis. The authors found that the third group, those who disagreed with their clinical diagnosis, reported the highest levels of pain and the greatest level of affective distress. The authors also concluded that the "unsure" group (group number one) and "disagree" group (group number three) had the lowest levels of perceived control over pain. Lack of knowledge causes increased distress and an increased perception of disability. Patient education and support can be a key component in a treatment program trying to rehabilitate a patient with chronic pain.

A therapy program designed to restore function as well as to educate patients on proper pain coping mechanisms would be an effective mode of treatment for these patients (Morley, Eccleston, & Williams, 1999). Due to the multitude of potential physiologic and psychosocial problems, a team approach to treatment may yield optimum treatment outcomes (Headley, 1991; Jenkins, 1999; Hankin, Spencer, Kegerries, Worrell, & Rice, 2001). The chronic pain patient can benefit greatly from a multidisciplinary approach to treatment (Fishbain, Rosomoff, Steele-Rosomoff, & Cutler, 1995; Fordyce, 1976; Philips, 1988). Fordyce (1976) states, "...chronic illness requires behavior change" (p. 29). One example of a treatment approach to chronic pain is a cognitive-behavioral model.

A cognitive-behavioral approach to treatment can help patients manage their pain and teach them to cope effectively with the multiple factors that add to

their pain (Kelly, 1996). Turner, Jensen, & Romano, (2000) attempt to describe cognitive-behavioral therapy. According to Turner et al., the theory behind this approach to treatment "holds that individual's beliefs and coping behaviors related to their pain play important roles in their adjustment" and that "cognitive-behavioral therapies aim to identify and modify maladaptive patient beliefs and increase the use of adaptive cognitive and behavioral coping skills" (p.115). Research into the effectiveness of a cognitive-behavioral treatment program combined with functional restoration of the patient with chronic pain is indicated.

In a research study by Strong (1998), patients with chronic low back pain in an existing inpatient pain management program were split into two groups. One group consisting of fifteen patients followed the standard pain management program and was considered the placebo group. A second group of fifteen patients followed the traditional pain management program, but had additional education utilizing cognitive-behavioral principles. The group with the additional education improved significantly over time and significantly more than the placebo group at post-treatment. The authors attributed the improved results to the patients having a feeling of control over their pain, and their use of positive coping strategies. A program that focuses on educating the patient on the cognitive/emotional aspect of pain and teaches them to utilize positive coping strategies may greatly assist in the recovery of patients with chronic pain.

The goal of a functional restoration program is not pain reduction, but to increase a patient's ability to function better and cope with the pain and stress of his or her current situation. Because managing stress is so important to

recovery, a treatment approach needs to be holistic to cover rehabilitation of both the body and the person. In a study by Frost, Lamb, and Shackleton (2000), 129 patients with chronic low back pain attended an outpatient functional restoration program. The authors found that there was a high level of psychological distress among the patients prior to treatment based on their responses to the Oswestry Low Back Pain Disability index and the General Health Questionnaire. At fifty-five weeks post-treatment, patients were reporting lower levels of distress and increased ability to function. The authors believed that the positive results of their study seemed to justify the functional restoration program, but they thought that more trials were necessary to fully establish this mode of treatment.

In the treatment of chronic pain, interventions designed to target both the physical and psychological aspects of pain can utilize measures of a patient's response to stress as a way to assess treatment outcomes. A psychological self-report by the patients regarding their stress level could be utilized to get an idea of the patients' perception of their injury or disability. "Self-report measures of symptoms reflect the patients' unique experience of their distress and condition (p. 535)" (Holcomb, Adams, & Ponder, 1983). Standardized tests such as the Symptom Checklist 90-Revised (SCL-90-R) can be a reliable and objective way to test the patients' current perceptions of their pain and suffering. It is important that the test covers a wide range of symptom dimensions in order to get an accurate picture of the complex pain response.

In a study by Wilson, Dworkin, Whitney, & LeResche, (1994), a distinction was made between psychological distress and somatization. The authors point

out that somatization is the tendency to report numerous somatic symptoms, which are symptoms pertaining to the body. They go on to say that psychological distress is represented by reports of numerous affective and cognitive symptoms such as those arising from feelings or emotions. In their study of 220 patients with chronic temporomandibular pain, they found that patients with a high level of somatization were three times more likely to report a painful placebo site on clinical examination of the face and neck muscles than those with a low level of somatization. The authors concluded that reports of pain were more closely linked to the report of somatic symptoms than to reports of affective/cognitive symptoms.

A standardized test that highlights somatization may be a useful tool to assess pain reports by chronic pain patients. Patients are more likely to report bodily dysfunction to health care providers. Knowing the somatization level of the patients may better assist the health care worker in understanding the state of distress the patients are presenting in relation to their perception of bodily dysfunction.

Interdisciplinary treatment of chronic pain patients is indicated because of the many factors involved in the pain process. The patient needs to be an integral part of the treatment team. When patients start to regain control over their bodies, their emotions and their life, their stress levels can be greatly reduced. They may no longer perceive themselves as disabled and unable to function. Treatment targeted at both the physical progress patients make and the change in their stress response is indicated.

Subgroups of Chronic Pain Patients

The term "chronic pain patient" tends to place people into a single category. However, it has been shown that patients with chronic pain differ significantly in their reported symptoms of psychological distress. Several attempts have been made to identify cluster groups of chronic pain patients. Cluster analysis generally is used to classify data by forming it into a set of homogeneous groups.

Various researchers have carried out cluster analyses of chronic pain patients. Turk et al. (1993) advocated the use of cluster analysis with chronic pain patients. They proposed that the purpose of cluster analysis is to "(1) develop a typology or classification system, (2) investigate useful conceptual schemes for group entities, (3) generate hypotheses through data exploration, and (4) test hypotheses, or determine if types defined through other procedures are in fact present in a data set" (p. 49). Through their study, they were able to identify primary subgroups of chronic pain patients based on factors analyzed using the West Haven-Yale Multidimensional Pain Inventory (WHYPI). Three clusters were identified based on response patterns on the psychosocial and behavioral scales. The authors report that cluster one reflects pain patients with an unusually high level of social distress. These patients held the perception that their families and significant others were not very supportive of them. Cluster two consisted of patients who believed their pain to be at a very high level and reported the pain interfered with many parts of their lives. The third group was labeled the "adaptive copers" as they reported lower levels of dysphoric mood

and they believed they had a better ability to control their own lives than the patients in the first two groups. Other researchers such as Williams et al. (1995) and Shutty and DeGood (1987) also were able to produce subgroup findings.

Williams et al. (1995), using the SCL 90-R, were able to identify three subgroups of chronic pain patients. Their analysis of SCL 90-R scores differentiated patients into high, medium, and low scoring subgroup clusters. S-scores were analyzed separately for men and women. Patients in cluster one reported the highest level of psychological distress; those in cluster two a moderate level; and patients in cluster three a low level of distress. The authors point out that even though cluster three had the lowest reports of psychological distress, their somatization subscale scores were still high for both men and women. The researchers suggested that cluster one patient's may be "very likely to benefit from cognitive behavioral interventions designed to reduce their psychological distress and emotional suffering" (p. 89).

Shutty and DeGood (1987) successfully identified three subgroups of patients using cluster analysis on 221 patients with chronic low-back pain based on the standardized scoring method (S-scores) of the Symptom Checklist-90R. The S-scores were analyzed separately by gender. The investigators found that three clusters were most appropriate for both males and females to distinguish homogeneous groups. Shutty and DeGood utilized k-means cluster analyses and compared the amount of within-cluster variance for differently sized cluster solutions. Williams et al. (1995) used an agglomerative hierarchical cluster analysis with Ward's minimum variance as the clustering method and squared

Euclidean distance as the proximities measure. For details on the sub groupings of each study, please refer to the individual research projects. Shutty and Degood , and Willams et al., used different methods of clustering and found similar results of a three-cluster solution, which implies that the finding is robust.

Many studies suggest that subgroups for chronic pain patients need to be replicated (Turk et al., 1993; Williams et al., 1995; Williams & Keefe, 1991). By identifying clusters of patients, the health care providers may direct specific treatment interventions to the various distress groups. As Turk et al. suggest, "identifying clusters of patients according to physical, psychosocial, and behavioral data should enhance our understanding of pain, assist in the prescription of specific therapeutic interventions, and improve our ability to predict treatment outcome" (p. 50). A study focusing on the change in levels according to subgroups after a treatment intervention is indicated.

Summary

It is apparent that pain is a complex process, especially when someone has the diagnosis of chronic pain. Treating chronic pain from purely a medical model can have little impact and may even perpetuate the problem as patients go through a series of invasive tests and procedures. Patients with chronic pain need to have a treatment approach that examines both their physical and psychological state. Psychological assessments can help provide a foundation from which the treatment approach needs to be developed. Objective outcome

measures such as the SCL-90-R can help the medical society to more accurately assess pain and direct treatment for the individual with chronic pain.

If chronic pain patients can be delineated into specific subgroups based on psychological testing, medical personnel may be able to better direct the patient into the most appropriate form of treatment. Attempts have been made to determine if subgroups of chronic pain patients exist. There is a need for validation of these subgroups, and for future studies to determine from which treatment each subgroup may derive the most benefit.

CHAPTER III

RESEARCH METHODS

The purpose of this study was to compare pre-treatment and post-treatment measures of the Global Severity Index (GSI) and the somatization subscale (SOM) of the SCL-90-R following a functional restoration program. Also, the study attempted to determine if subgroups of chronic pain patients could be identified and replicated as in prior studies.

Participants

The participants for this retrospective study were 100 patients diagnosed with chronic pain. The sample was comprised of 54 men and 46 women, who ranged in age from 22 to 63 years (M = 42.8, SD = 8.6). The years of education completed by the patients ranged from 6 to 16 (M = 12.2, SD = 1.7). The distribution of the participants according to their job classifications is as follows: professional, technical, or managerial (10%); clerical, sales, or processing (23%); service (14%); machine and bench work trades (19%); structural (20%); and miscellaneous or unknown (14%). The average number of months following injury that treatment was begun was 24.3 (SD = 27.8) and ranged from 3 to 172 months; however, the vast majority of patients (71%) began treatment within 24 months of their injury and nearly all patients (88%) were treated within 36 months of their injury. These patients complained about chronic pain involving the back (54%), the neck (20%), a single extremity (12%), multiple sites (13%) or head aches (1%). Most of the patients (65%) had not undergone

any surgery prior to treatment, whereas 25% had experienced one injury-related surgery, 9% had experienced two surgeries, and 1% had three surgeries prior to treatment.

Each patient was rated for the number of "pathognomonic signs" present prior to treatment (none, one, multiple), which primarily included the presence of conditions such as sleep disorder and major depression. Among the sample, 23% were rated as having none of these conditions, 19% were rated as having one of these conditions, and 58% were rated as having two or more ("multiple"). Treatment costs for most of the patients were covered by workers compensation (74%), whereas 25% were covered by automobile insurance, and the remaining 1% were covered by other means. Twenty-eight percent of the patients had retained an attorney at the time of the initial assessment.

Instrumentation

The Symptom Checklist-90-R instrument is a psychological symptom inventory used to assess psychopathology (Cournos & Cabaniss, 1997). Leonard R. Derogatis, Ph.D, developed the test in 1976 and revised it in 1983. According to Derogatis, "The SCL-90 is a multidimensional symptom self-report inventory comprised of 90 items, each rated on a five-point scale of distress (0 to 4) from 'not at all' to 'extremely'. The instrument is scored on nine primary symptom dimensions plus three global indices of pathology" (p. 281) (Deragotis, Rickles, & Rock, 1976). (See Table 1).

Table 1. The Primary Symptom Dimensions of the SCL-90-R and the Global Indices

Dimension	Description
• Somatization (SOM)	12 items reflecting distress arising from perceptions of bodily dysfunction
• Obsessive-Compulsive (O-C)	10 items which include symptoms identified as O-C behavior
• Interpersonal Sensitivity (I-S)	9 items that focus on feelings of inadequacy and inferiority
• Depression (DEP)	13 items that reflect the range of the manifestations of clinical depression
• Anxiety (ANX)	10 items that reflect general signs of anxiety such as nervousness and panic attacks
• Hostility (HOS)	6 items that reflect thoughts, feelings, or actions that are characteristic of anger
• Phobic Anxiety (PHOB)	7 items which focus on an irrational fear response that leads to avoidance behavior
• Paranoid Ideation (PAR)	6 items that represent paranoid behavior as a disordered mode of thinking
• Psychoticism (PSY)	10 items which provide a graduated continuum from mild interpersonal alienation to dramatic psychosis
• Global Severity Index (GSI)	This score combines information concerning the number of symptoms reported with the intensity of perceives distress
• Positive Symptom Distress Index (PSDI)	A measure of response style that indicates whether the respondent was augmenting or attenuating symptomatic distress
• Positive Symptom Total (PST)	Reflects the number of symptoms endorsed regardless of the level of distress; a measure of symptom breadth

The SCL-90-R is user-friendly, designed at a sixth grade reading level and available on a cassette for those who cannot read. The SCL-90-R takes about 20 minutes to complete. The battery measures one's recent emotional state (defined as the patient's experiences one week prior to taking the test) and can be used as an outcome or status measure of psychological distress (Peveler & Fairburn, 1990). The questions from the SCL-90-R focus on the "state" of the participant rather than "trait" qualities because the answers patients give are based on their experiences over the past week.

The SCL-90-R is one of the most widely used assessment systems for psychopathology and is used extensively in the literature (Williams et al., 1995; Shutty & DeGood, 1987). It is normed on the United States population. There are three reference groups including non-patients, psychiatric outpatients, and psychiatric inpatients (Deragotis, 1976; Peveler & Fairburn, 1990). The test has a built in lie scale that can assess if patients are over-endorsing or downplaying symptoms, and if they are being inconsistent with their answers. Computerized scoring for the SCL-90-R is available from National Computer Systems (NCS) and was utilized in this study. Raw scores were converted to standard subscale scores using the methods described by Derogotis (1983).

Internal consistency reliability of the domains was tested using the coefficient alpha, which is a multipoint variation of the Kuder-Richardson formula 20. Values ranged from a low of .79 to a high of .90. The test is reliable with the "majority of coefficients between .80 and .90" for test-retest reliability on each of the symptom constructs (p.28) (Derogotis, 1983). Cronbach alpha values for the

separate scales of the SCL-90-R could not be calculated for the current ctudy because individual item data were not available to the investigator. However, a large robust literature exists for the SCL-90-R that establishes the reliability and validity of each scale for use with clinical and non-clinical populations (Deragotis, 1983).

The instrument was validated for internal structure with the Minnesota Multiphasic Personality Inventory (MMPI). Values for comparable domains range from .41-.75. The results "illustrate highly acceptable levels of convergent-discriminantt validity" (p. 33) (Deragotis, 1983). The SCL-90-R dimensions had their highest correlations with comparable MMPI constructs in all areas except the Obsessive-Compulsive domain, which had no directly comparable scale on the MMPI.

The SCL-90-R provides a graphed presentation of the nine symptom dimensions. There are three primary summary scores. Deragotis et al. (1976) report, "the global indices of pathology are the Global Severity Index (GSI), the Positive Symptom Distress Index (PSDI), and the Positive Symptom Total (PST). The GSI combines information on numbers of symptoms and intensity of distress; the PSDI is a pure intensity measure; and the PST communicates data on number of symptoms only" (p. 284). The GSI is the arithmetic average of all 90 items, so scores range from 0 to 4. The GSI represents global distress across all nine scales (i.e. the average severity of all domains measured by the scale). The GSI is computed by "first summing the scores on the nine symptom dimensions and the additional items. This sum is then divided by the total

number of responses (90 if there are no missing responses). The PST is calculated by counting the number of items endorsed with a positive (nonzero) response. The PSDI is calculated by dividing the sum of all item values by the PST " (p.14) (Deragotis, 1983). The SCL-90-R covers a wide range of emotional problems and can be used to show changes that occur with rehabilitation.

The SCL-90-R has nine symptom categories: somatization, obesessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychotics. The somatization scale is considered to be a measure of "subjective distress arising from the perception of bodily dysfunctions" (Derogatis et al., 1976). One source of patients' distress is the loss of control they feel over their situation. The pain coupled with their perceived inability to function can overwhelm them.

Procedures

Each participant was referred to the Functional Recovery Program of Michigan after being examined by a physiatrist (a medical doctor specializing in physical medicine and rehabilitation). The patients signed a consent form for treatment when meeting with the physician for the first time (see Appendix A). Once referred by the physician, the participants met with the program psychologist to complete a personal data and interview sheet (see Appendix B), and the SCL-90-R (see Appendix C). The patients had to meet admission criteria in order to be a candidate for the program (see Table 2). The patients determined to be candidates for the program then met with the interdisciplinary

team and decided if they wanted to enter into the functional restoration program and signed an agreement to participate (see Appendix D). The program was a voluntary treatment option. Approval for the study was obtained from the University Committee on Research Involving Human Subjects (UCRIHS) (see Appendix E).

Testing Environment

Each participant was administered the SCL-90-R prior to admission into the treatment program and again at the end of the seven-week program. The SCL-90-R was individually administered. The program psychologist gave the participants administrative instructions. The participants took the test in a quiet room and were allowed to sit or stand as needed to allow for maximum comfort. If the patients had difficulty reading the information, a family or staff member was allowed to read the question to the patient. The assistant was instructed to only read the question to the patient, but not to interpret the questions or lead the patient to an answer. The test time took approximately 15-20 minutes, but the patients were allowed as much time as needed to fully complete the SCL-90-R.

Treatment Program

The Functional Recovery Program of Michigan is located in West Bloomfield, Michigan. The functional restoration program specializes in a cognitive-behavioral treatment approach for chronic pain. At the time of this study, the program consisted of an interdisciplinary team including a program psychologist, nurse, vocational counselor, physical therapist, occupational

therapist, and recreation therapist. A physiatrist who is the medical director heads the team.

Table 2. Admission Criteria for the Functional Restoration Program

- Able to comprehend and communicate to allow program participation
- Must be 18 years of age or older
- Willing to complete the assessment process
- Experienced chronic non-malignant pain for a minimum of three months
- Experienced reduction in vocational or avocational activites
- Not currently utilizing proper pain coping strategies determined by the program psychologist based on responses to the SCL-90R, and the interview questions
- Reporting or demonstrating mild/moderate emotional distress
- Willing to work towards patient stated goals, such as return to work, recreational activities, learn positive coping strategies, etc.
- Medically stable
- Willing to sign the program agreement

The patients with chronic pain underwent a seven-week functional restoration program after completing a medical and psychological assessment process. Participants met with the rehabilitation team prior to their entry into the program to finalize their personal goals in the areas of household, work, recreation, socialization and medication use. The patients were not asked to rate

their pain level, as the goal of the program was not pain reduction, but functional restoration. The treatment was offered four times a week in a group setting. For a description of the program and a sample daily schedule, please refer to Appendix F. The starting dates for treatment for the patients were staggered. Patients were continuously admitted to the program on an on-going, weekly basis. This allowed for the senior patients to act as role models and sources of support for the newer patients.

The patients participated in a variety of physical activities including strength training, stretching exercises, aerobic conditioning and functional tasks. Patients receiving treatment in the morning would start their day with a 30-minute stretching routine lead by one of the therapists. They would then listen to a guided imagery tape for ten minutes to help them relax. Then the patients would begin their exercise routine of weights and aerobic activity utilizing the treadmill or bike. They had daily graphs to follow that helped them to slowly increase their aerobic time and intensity of resistance. The starting points on the graphs were based on the participants' performance over the first three days in the functional recovery program. The physical, occupational, and recreational therapists guided the participants through their activities and were available to provide feedback and to answer questions.

Participants would then meet in a room to listen to a lecture on an educational topic. Patients receiving treatment in the afternoon would join the morning group so that they could all hear the lecture together. The educational sessions were lead by the various members of the rehabilitation team. The

sessions covered a variety of topics relating to chronic pain from both a physical and psychological approach. Some sessions focused on how the body works and functions and allowed the patients to begin to participate in both functional and recreational tasks. Through the educational sessions, the patients were taught techniques on how to improve sleep, handle anxiety, and utilize proper pain coping strategies. This assisted patients with their ability to manage their pain from a cognitive level.

Following the lecture, all the participants engaged in recreational and aquatic exercise classes together because the pool and recreation areas were only available for a limited amount of time. After a second lecture, the morning group was dismissed and the afternoon group engaged in their stretching, relaxation, aerobic and weight exercises prior to their dismissal.

The patients met with the program psychologist individually to review their pre-treatment SCL-90-R test results. One limitation of the study is that we could not control for the Hawthorne effect from patients knowing their pre-test results. The patients needed this knowledge to help them learn their areas of difficulty in order to work productively with the program psychologist. The psychologist would then meet with the patients on an "as needed" basis, averaging 2-3 visits during the seven-week program. Upon completion of the program, the patients completed the SCL-90-R standardized test again. Results from the SCL-90-R pre and post testing were the focus of analysis for this study.

Treatment of Data

The data analyzed in this study was from a previous project performed at the Functional Recovery Program of Michigan. The following analyses were conducted according to each specific hypothesis.

Hypothesis 1. Chronic pain patients will demonstrate a significant decrease in the Global Severity Index (GSI) score on the Symptom Checklist 90-R (SCL-90R) from pre- to post-testing following the completion of a seven-week functional restoration program. The decrease in score will represent a lower overall self-reported intensity of perceived distress.

This hypothesis will be tested using multivariate repeated-measures ANOVA, with time (pretest vs. posttest) as a within-subject factor. The GSI score will be the dependent variable.

Hypothesis 2. Chronic pain patients who completed the seven-week functional restoration program will report significantly more improvement on the somatization (SOM) scale of the SCL-90-R than on other scales of the SCL-90-R. The somatization scale most accurately reflects the level of a patient's distress arising from perceptions of bodily dysfunction. Therefore, this specific subscale will be most affected by the intervention.

Treatment responses will be investigated by examining change in the individual SCL scales from pre-treatment to post-treatment. Change scores (i.e., difference scores) will be calculated by subtracting post-treatment (Time 2) scores from pre-treatment (Time 1) scores. These change scores will be

analyzed using multivariate repeated-measures ANOVA, with scale as a within-subject factor. A main effect of scale would indicate that the nine scales showed different amounts of change over time. Post hoc tests will employ simple paired contrasts to compare the change on each of the SCL-90-R scales relative to change on the SOM scale.

Hypothesis 3. Prior to treatment, three distinct groups will best characterize chronic pain patients replicating the three-cluster solution observed by Williams et al., (1995).

Cluster analyses will be conducted on pretest data to determine whether subgroups of chronic pain patients can be established based on initial SCL-90-R scale scores. A two-step approach employing both hierarchical and non-hierarchical methods of cluster analysis will be used to segment the patient sample (Aldenderfer & Blashfield, 1984; Hartigan, 1975; Milligan, 1980). The first step in partitioning the population will use a hierarchical technique (Ward's minimum variance method using squared Euclidean distances) to establish the most appropriate number of clusters and identify any obvious outliers (Aldenderfer & Blashfield, 1984; Borgen & Barnett, 1987). The second step in the analysis will use a non-hierarchical, nodal clustering method (k-means). The k-means method begins with a specified number of clusters determined by the hierarchical analysis then refines the hierarchical solution by assigning cases to the clusters in a manner that best minimizes the Euclidean distance or error (Aldenderfer & Blashfield, 1984).

Exploratory analyses investigated potential differences between the clusters in treatment response associated with demographic and illness-related variables. If subgroups are identified, it will be of interest to the investigator to determine if significant differences exist in the level of SCL-90-R scores following the treatment intervention among the subgroup clusters.

Cluster analysis generally is used to classify data by forming it into a set of homogeneous groups. Cluster analyses will be used to identify subgroups of chronic pain patients based on their responses to the SCL-90R. Shutty and DeGood (1987) utilized k-means cluster analyses and compared the amount of within-cluster variance for differently sized cluster solutions. Williams, et al. (1995) used an agglomerative hierarchical cluster analysis with squared Euclidean distance used in the proximities matrix and, Ward's minimum variance used as the clustering method. For details on the sub groupings of each study, please refer to the individual research projects. Shutty and Degood, and Williams et al., used different methods of clustering and found similar results of a three-cluster solution, which implies that the finding is robust.

For purposes of this study, attempts were made to replicate the findings of the Williams et al. (1995) study utilizing their statistical methods. The researcher believes that hierarchical methods tend to be better for establishing the most appropriate number of clusters, whereas nodal (e.g., k-means) methods are better for assigning cases to the clusters, once the number of clusters has been determined. A two-step approach that employs the advantages of both methods

was utilized in this study. The Statistical Package for the Social Sciences (SPSS) was used for all factor analyses (Nie, Hull, & Jenkins, 1975).

CHAPTER IV

RESULTS AND DISCUSSION

This chapter contains two major sections: 1) results of the statistical procedures used to test each of the three hypotheses in this study; and 2) a general discussion of the results obtained. In the first section, the results pertaining to each hypothesis will be presented separately. All results are reported at the .05 level of significance unless otherwise specified.

Results

Hypothesis 1: Chronic pain patients will demonstrate a significant decrease in the Global Severity Index (GSI) score on the Symptom Checklist 90-R (SCL-90R) from pre- to post-testing following the completion of a seven-week functional restoration program.

Data considerations

Treatment response was investigated by examining changes in the GSI score and the individual SCL scale scores from pre-treatment to post-treatment. Table 1 presents descriptive statistics for the pre-treatment and post-treatment SCL-90-R variables. Although a multivariate, repeated-measures ANOVA had been planned to examine treatment change, the data violated assumptions necessary for conducting parametric statistics. Examination of the distributions of the GSI and the SCL-90-R scale scores at pre- and post-treatment indicated

significant positive skew for many of the variables ($Z > 4.0$). Attempts to transform the variables using traditional methods (e.g., logarithmic and square root transformations) were unsuccessful. Therefore, group comparisons were performed using nonparametric tests.

Wilcoxon Signed-Ranks Tests

Wilcoxon signed-ranks tests, analogous to paired-sample t tests, were used to compare pre- and post-treatment scores on the SCL-90-R scales and the GSI (i.e., within-subject comparisons). One-tailed tests were conducted because directional hypotheses predicted lower scores at post-treatment than at pre-treatment. The results of these comparisons are presented in Table 3. As can be seen in Table 3, the GSI score showed a significant decrease from pre-treatment to post-treatment ($p<.004$). Thus, the results support Hypothesis 1. Additionally, all individual SCL-90-R scales except HOS, PAR, and PHO showed significant improvement over time.

Hypothesis 2: Chronic pain patients who completed the seven-week functional restoration program will report significantly more improvement on the somatization (SOM) scale of the SCL-90-R than on other scales of the SCL-90-R.

Table 3. Descriptive Statistics and Wilcoxon Signed-Ranks Tests for SCL-90-R Scores

SCL-90-R Score			**Wilcoxon Signed Ranks**	
	M	*SD*	*Z*	*P*
Global Severity Index$_1$	1.16	0.65		
Global Severity Index$_2$	1.00	0.72	-2.69	.004
Anxiety$_1$	1.01	0.75		
Anxiety$_2$	0.86	0.83	-2.34	.009
Depression$_1$	1.53	0.93		
Depression$_2$	1.21	0.95	-3.55	< .001
Hostility$_1$	0.85	0.77		
Hostility$_2$	0.77	0.87	-1.25	.106
Interpersonal Sensitivity$_1$	0.92	0.79		
Interpersonal Sensitivity$_2$	0.78	0.77	-2.17	.015
Obsessive-Compulsive$_1$	1.47	0.96		
Obsessive-Compulsive$_2$	1.29	0.94	-1.76	.039
Paranoid Ideation$_1$	0.84	0.75		
Paranoid Ideation$_2$	0.78	0.75	-0.67	.252
Phobic Anxiety$_1$	0.69	0.94		
Phobic Anxiety$_2$	0.63	0.93	-0.41	.341
Psychoticism$_1$	0.68	0.57		
Psychoticism$_2$	0.62	0.62	-1.77	.038
Somatization$_1$	1.56	0.65		
Somatization$_2$	1.35	0.71	-3.30	< .001

Treatment responses were investigated by examining change in the individual SCL-90-R scales from pre-treatment to post-treatment. Change scores (i.e., difference scores) were calculated by subtracting post-treatment (Time 2) scores from pre-treatment (Time 1) scores. Examination of the distributions of the change scores revealed univariate outliers on three of the SCL-90-R scales (Depression, Interpersonal Sensitivity, and Obsessive-Compulsive), which produced significant skewness in the data for these scales ($Z > 3.0$). As recommended by Tabachnick and Fidell (2000), the impact of these outliers was minimized by using the winsorizing technique.

Winsorizing is a technique that reduces the impact of statistical outliers. Univariate outliers are cases with an extreme score on one variable. One way to detect an outlier is to evaluate the standardized (i.e., z score) equivalent of the score. The cutoff for outlier status depends on each researcher's tolerance for deviation from the normal distribution and on the sample size; however, standard conventions are to label a score as a univariate outlier if $z > 3$, $z > 3.29$, etc. Graphical methods (e.g., boxplots, histograms) also are helpful in identifying outliers. Once an outlier or outliers are identified, they must be reduced, or one extreme score may disproportionately affect the result. One method to eliminate the outlier is to delete the entire case from the study. This may be unacceptable to many researchers because it reduces the sample size and produces a more select sample. If deleted, cases with extreme values are no longer represented in the sample. Winsorizing resolves the problem of a skewed distribution and disproportionate influence by reassigning the value of the case a raw score that

is one unit larger (or smaller) than the next-most deviant score in the distribution. In this manner, the extreme case is represented in the sample, but its disproportionate influence is reduced (Tabachnick & Fidell, 2000). In the present study, these transformations were successful in correcting the distributions on the variables to meet the criteria for parametric tests.

The change scores were analyzed using multivariate repeated-measures ANOVA, with SCL-90-R scale scores as a within-subject factor. According to Wilks' criterion the ANOVA was significant, indicating that the nine scales showed different amounts of change over time, $F(8, 92) = 3.25$. Eta squared (eta^2) for the analysis was .22, indicating a large effect size. According to Cohen (1977), an eta^2 of .06 represents a medium effect size, whereas an eta^2 of .14 represents a large effect size. Post hoc tests employed simple paired contrasts to compare the change on each of the SCL-90-R scales relative to change on the Somatization scale. The results of these analyses are presented in Table 4. As can be seen in Table 4, the magnitude of the change on the Somatization scale exceeded that of all other scales except the Depression scale. However, change on the Somatization scale was significantly greater than that on the Paranoid Ideation, Phobic Anxiety, and Psychoticism scales ($p < .05$), but was not significantly greater than the changes on the Anxiety, Interpersonal Sensitivity, Obsessive-Compulsive, and Hostility scales. The effect sizes of the differences were small. The results provide only partial support for the second hypothesis in that the change in Somatization was not significantly greater than the changes on all the other scales.

Table 4. Post hoc Tests for SCL-90-R Change Scores Relative to Change on Somatization

Scale	*Mean Change*	*SD Change*	*F*(1,99)	*Eta*^{2}	*p*
SOM_1-SOM_2	0.20	0.61			
ANX_1-ANX_2	0.15	0.69	0.96	.01	.330
DEP_1-DEP_2[1]	0.30	0.75	3.28	.03	.073
HOS_1-HOS_2	0.09	0.77	2.78	.03	.099
IS_1-IS_2[1]	0.14	0.58	1.33	.01	.251
OC_1-OC_2 [1]	0.17	0.73	0.33	.00	.566
PAR_1-PAR_2	0.06	0.67	4.59	.04	.035
PHO_1-PHO_2	0.06	0.73	5.26	.05	.024
PSY_1-PSY_2	0.07	0.49	6.35	.06	.013

$F(8, 92) = 3.25$, $eta^2 = .22$.

Note. Post hoc tests compare each pre-post treatment change on each SCL-90-R scale to pre-post treatment change on the Somatization scale.

1. Transformed variable: Winsorized univariate outlier.

Hypothesis 3: Prior to treatment, chronic pain patients will be best characterized by three distinct groups, replicating the three-cluster solution observed by prior researchers (e.g., Williams et al., 1995; Shutty & DeGood, 1987).

Cluster Analysis

Cluster analysis generally is used to classify data by forming it into a set of homogeneous groups. In the present study, cluster analysis was used on pre-test SCL-90-R data to delineate groups of participants who produced similar symptom profiles. Thus, the goal was to determine whether these patients had a unitary clinical presentation or whether there were meaningful subsets of respondents with distinct symptom profiles.

A two-step approach employing both hierarchical and non-hierarchical methods of cluster analysis was used to segment the patient sample (Aldenderfer & Blashfield, 1984; Hartigan, 1975; Milligan, 1980). The first step in partitioning the population used a hierarchical technique (Ward's minimum variance method using squared Euclidean distances) to establish the most appropriate number of clusters and identify any obvious outliers (Aldenderfer & Blashfield, 1984; Borgen & Barnett, 1987). The second step in the analysis used a non-hierarchical, nodal clustering method (*k*-means). The *k*-means method begins with a specified number of clusters determined by the hierarchical analysis then refines the hierarchical solution by assigning cases to the clusters in a manner that best minimizes the Euclidean distance or error (Aldenderfer & Blashfield, 1984).

To replicate the analyses conducted by Shutty and DeGood (1987), the cluster analyses also were performed separately for each gender. To evaluate the consistency of the results with prior research findings, these cluster assignments were compared to a cluster analysis conducted using the total

sample combined and to cluster assignments using the criteria described by Williams et al. (1995) in their study of SCL-90-R profiles observed in chronic pain patients.

Hierarchical Analysis. Several analyses of the hierarchical results were used in determining the appropriate number of clusters. A common technique for determining the best number of clusters involves evaluating the "tightness" of the clusters by examining increases in the mean square error for each solution (Aldenderfer & Blashfield, 1984; Borgen & Barnett, 1987). To help identify large relative increases in the cluster homogeneity, the percentage change in the agglomeration coefficient was calculated for 2 to 5 clusters. A cluster analysis was conducted on the total sample (i.e., men and women combined). The results indicated that a three-cluster solution was most appropriate, as the greatest change in within-cluster variance was observed when three clusters were employed.

An agglomeration schedule providing information on individual cluster membership for three-, and four- and five-cluster solutions further supported a three-cluster solution: The majority of cases retained the same cluster membership from the three-cluster through the five-cluster solution. Changes in cluster membership primarily reflected the divisions of a main cluster into smaller cluster groupings rather than assignment of the case to an entirely different cluster branch (i.e., few cases "crossed over" to different cluster segments). Thus, the cluster solution in the present study replicated a three-cluster solution

similar to those reported by Shutty and DeGood (1987) and Williams et al. (1995).

K-Means Analysis. The *k*-means analysis assigned 19 cases to Cluster 1, 40 cases to Cluster 2, and 41 cases to Cluster 3. The means of each symptom dimension for the three clusters are plotted in Figure 1.

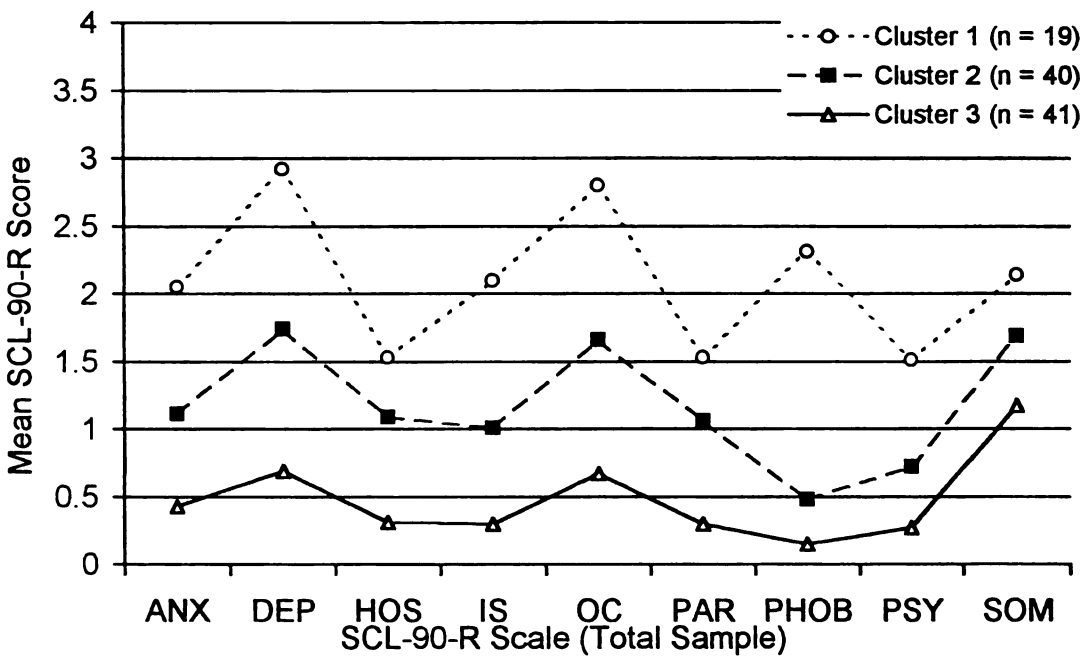

Figure 1. Profiles of SCL-90-R Scales for the three-cluster solution

As can be seen in figure 1, with the exception of a spiked elevation on Phobic Anxiety and Interpersonal Sensitivity among patients in Cluster 1, the symptom profiles of the three clusters are generally of similar shape. However, the groups are separated by level of endorsement, with Cluster 1 showing the

highest level of distress and Cluster 3 showing the least distress. Because the *k*-means cluster analysis is designed to maximize distance between the clusters, tests for differences between cluster centers on each symptom dimension are not required; however, a check of these univariate tests confirmed significant group differences on all scales (all *ps* < .001). As expected, a univariate ANOVA testing group differences on GSI at Time 1 (which represents the average elevation of the 9 scales) indicated significant differences across the three clusters, $F(2, 97) = 312.07$, $p < .001$. Tukey post hoc tests indicated that Cluster 1 GSI ($M = 2.20$, $SD = 0.30$) was significantly greater than Cluster 2 ($M = 1.28$, $SD = 0.22$), Cluster 2 GSI was significantly greater than Cluster 3 ($M = 0.56$, $SD = 0.23$), and Cluster 1 GSI was significantly greater than Cluster 3 (all *ps* < .001). These results support the third hypothesis.

Analyses for Men and Women

Similar to the total sample cluster analyses, two-step cluster analyses were conducted for the separate samples of men and women. To identify large relative increases in the cluster homogeneity, the percentage change in the agglomeration coefficient was calculated for 2 to 5 clusters. The largest increases were observed in going from three to two clusters (men 79.6%; women 75.2%), indicating that the three-cluster solution was most appropriate for both men and women. For both samples, the next largest increase in the agglomeration coefficient occurred in the stop from four to three clusters (men 49.4%; women 52.0%). Agglomeration schedules providing information on

individual cluster membership for three-, four-, and five-cluster solutions further supported the three-cluster solutions: Among men, 50% of the cases retained the same cluster membership from the three-cluster through the five-cluster solution; and, among women, 41% of the cases retained the same cluster membership from the three-cluster through the five-cluster solution. In all cases, changes in cluster membership reflected the divisions of a main cluster into smaller cluster groupings rather than assignment of the case to an entirely different cluster branch (i.e., no cases "crossed over" to different cluster segments).

The combined sample cluster analysis (N = 100) assigned all but 14 cases to the same cluster as was observed in the cluster analyses conducted for each gender separately. Thus, the cluster assignments made by the gender-separate cluster analyses were identical to the cluster assignments made by the total sample cluster analysis for all but 14 cases. All 14 of the cases assigned to different clusters in the combined sample analysis were women, with 7 women reassigned from Cluster 3 (Low GSI) to Cluster 2 (Moderate GSI), and 7 women reassigned from Cluster 2 (Moderate GSI) to Cluster 1 (High GSI). Thus, the total sample cluster analysis tended to overpathologize these women in assigning cluster membership. However, chi-square analyses indicated that the proportions of men and women assigned to each cluster did not differ significantly for either the combined-sample cluster assignments, $X^2(2, N = 100) = 2.78$, $p = .248$, or the gender-separate cluster assignments, $X^2(2, N = 100) = 0.60$, $p = .742$.

For men, the *k*-means analysis assigned 7, 23, and 24 cases to Clusters 1 through 3, respectively. The means of each symptom dimension for men in the three clusters are plotted in Figure 2. For women, the *k*-means analysis assigned 5, 17, and 24 cases to Clusters 1 through 3, respectively. The means of each symptom dimension for women in the three clusters are plotted in Figure 3.

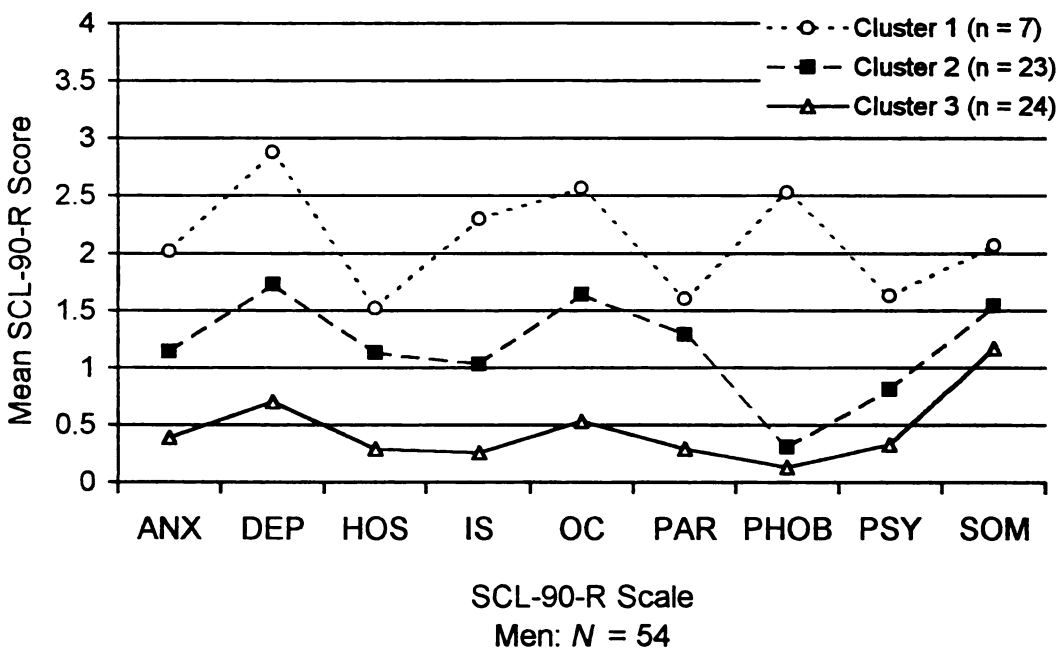

Figure 2: Profiles of SCL-90-R scales for the three-cluster solution: Men

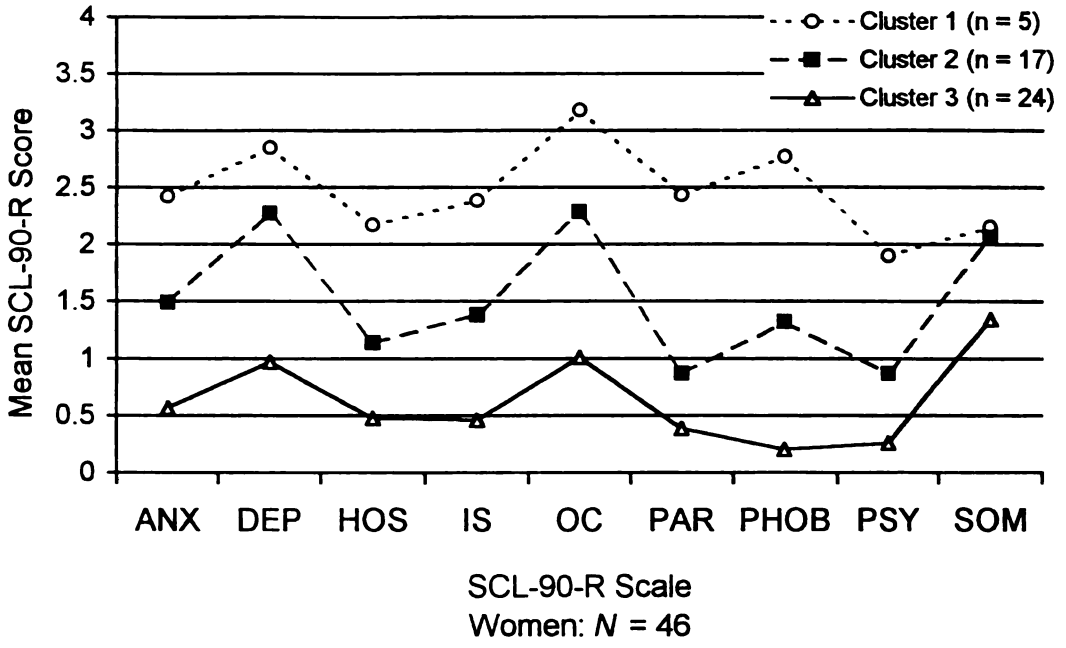

Figure 3: Profiles of SCL-90-R scales for the three-cluster solution: Women

As was observed in the total sample cluster analysis, with the exception of elevations on Phobic Anxiety, the symptom profiles of the three clusters were similar. However, the groups were separated by level of endorsement, with Cluster 1 showing the highest level of distress and Cluster 3 showing the least distress. A check of the univariate tests confirmed significant group differences on all scales for both cluster analyses (all *ps* < .001). As expected, a univariate ANOVA testing group differences on GSI at Time 1 (which represents the average elevation of the 9 scales) indicated significant differences across the three clusters for the sample of men, $F(2, 51) = 169.21$, $p < .001$. Tukey post hoc tests indicated that Cluster 1 GSI ($M = 2.22$, $SD = 0.19$) was significantly greater than Cluster 2 ($M = 1.28$, $SD = 0.21$), Cluster 2 GSI was significantly greater than Cluster 3 ($M = 0.54$, $SD = 0.24$), and Cluster 1 GSI was significantly

greater than Cluster 3 (all *ps* < .001). Similarly, for the sample of women, univariate ANOVA indicated a significant difference in GSI across the three clusters, $F(2, 43) = 86.33$, $p < .001$. Tukey post hoc tests indicated significant differences between all combinations of comparisons between Cluster 1 (*M* =2.48, *SD* = 0.35), Cluster 2 (*M* = 1.66, *SD* = 0.32), and Cluster 3 (*M* = 0.73, *SD* = 0.30).

Overall, in examining the cluster solutions for both men and women, these analyses appear to replicate a three-cluster solution, similar to those reported by Shutty and DeGood (1987) and Williams et al. (1995).

Characteristics of Cluster Members

Descriptive statistics for variables describing the three clusters as assigned in the gender-separate analyses are reported in Table 5. Overall, the clusters were similar on the demographic variables examined (age, education, and gender). ANOVAs indicated that the three clusters did not differ with regard to age [$F(2, 97) = 0.66$, $p = .94$] or years of education [$F(2, 97) = 0.14$, $p = .87$]. A chi-square analysis indicated that the proportions of men and women assigned to each cluster did not differ significantly, $X^2(2, N = 100) = 0.60$, $p = .742$. Therefore, men and women were equally likely to be assigned to each of the three clusters.

Additional tests were conducted to compare the clusters on illness-related variables. Nonparametric Kruskal-Wallis tests were conducted to test for group differences on months post injury and number of surgeries, because these

Table 5. Characteristics of patients in Clusters 1, 2 and 3

Variable	Cluster 1 *n* = 12		Cluster 2 *n* = 40		Cluster 3 *n* = 48		
	M	*SD*	*M*	*SD*	*M*	*SD*	
Age (years)[1]	43.5	10.6	42.5	9.1	42.9	7.7	
Education (years)[1]	12.0	1.28	12.3	1.8	12.3	1.8	
Percent Men[2]	58.3		57.5		50.0		
Months post injury[3]	21.5	17.9	23.9	31.9	25.4	26.5	
Number of surgeries[3]	0.3	0.8	0.5	0.6	0.5	0.7	
GSI Time 1[1]	2.33	0.29	1.44	0.32	0.64	0.29	***
Percent with Attorney[2]	58.3		20.0		27.1		***
	Pathognomonic Sign (percent)[2]						
None	0		5		43.8		
One	0		0		39.6		
Multiple	100		95		16.7		
	Primary complaint[2]						
Back pain	41.7		60.0		50.0		
Neck pain	16.7		15.0		27.1		
Other	41.7		25.0		22.9		

1. Analysis of variance; 2. Chi-square tests; 3. Kruskal-Wallis tests.

*** $p < .001$.

variables were badly skewed and did not have normal distributions. The Kruskal-Wallis test is the nonparametric analog of univariate ANOVA and detects differences in distribution locations. It is similar to the Mann-Whitney test, but it is appropriate for comparing the scores of three or more groups. Neither months post injury [Kruskal-Wallis $X^2(2) = 1.07$, $p = .60$] nor number of surgeries [Kruskal-Wallis $X^2(2) = 1.12$, $p = .55$] were significantly different between the groups.

The association of the patient's chief presenting complaint with cluster membership was investigated using chi-square analysis. To ensure adequate expected values in each cell for the analysis, presenting complaints focusing on the extremities, headache, and multiple other sites were collapsed into a single category "other" and compared to primary complaints involving back pain or neck pain. The chi-square analysis indicated that the clusters did not significantly differ in this regard, $X^2(4, N = 100) = 3.70$, $p = .45$. Chief presenting complaint did not account for group differences in clusters.

Chi-square analysis did indicate that patients in Clusters 1 and 2 were significantly more likely to have multiple pathognomonic signs than were patients in Cluster 3, $X^2(4, N =100) = 65.19$, $p < .001$. As can be seen in Table 3, 100% of the patients in Cluster 1 and 95% of the patients in Cluster 2 were rated as having multiple (i.e., more than one) pathognomonic signs, whereas 44% of patients in Cluster 3 had no pathognomonic signs and only 17% were rated as having more than one pathognomonic sign. Additionally, chi-square analysis indicated that patients in Clusters 1 were more likely to have an attorney than

were patients in Clusters 2 and 3, $X^2(2, N=100) = 6.77$, $p = .034$. Nearly 60% of the patients in Cluster 1 had an attorney, whereas only 20% of the patients in Cluster 2 and 27% of the patients in Cluster 3 had attorneys (see Table 5). In summary, the three clusters were similar on most demographic variables; however, the two clusters presenting with the highest levels of distress were more likely to have multiple comorbid conditions, and the cluster presenting the most distressed also was more likely to have retained an attorney.

Williams et al. (1995) Guidelines Applied to Gender Cluster Analyses

The stability of the assignments to the three clusters was tested further by assigning each case to a cluster using the guidelines specified for men and women by Williams et al. (1995). Using these criteria, only 19% of cases (7 men and 12 women) were assigned to clusters different than those specified by the separate-gender cluster analysis conducted on the present sample. Men were assigned to Clusters 1 through 3 using the Williams et al. criteria as follows: Cluster 1 = 10, Cluster 2 = 18, and Cluster 3 = 26. Women were assigned to Clusters 1 through 3 using the Williams et al. criteria as follows: Cluster 1 = 2, Cluster 2 = 23, and Cluster 3 = 21. When comparing the Williams et al. cluster assignments to the cluster assignments of men using separate-gender cluster analyses, 7 cases were differently assigned: 4 cases were assigned to a cluster indicating greater distress, whereas 3 cases were assigned to a cluster indicating less distress. Comparing Williams et al. cluster assignments to the cluster assignments of women using the separate-gender cluster analyses, 6 cases

were assigned to a cluster indicating greater distress, and 6 cases were assigned to a cluster indicating less distress.

Overall, the results of the cluster analyses conducted on chronic pain patients for the present study were highly consistent with results reported in previous research using both purely statistical (Shutty & DeGood, 1987) and criteria-based (Williams et al., 1995) assignment of cases to clusters.

Discussion

The results of this study support the belief that a cognitive-behavioral treatment approach, provided through a functional restoration program, can have a significant impact on patients' self-reported distress levels. The GSI score of the patients showed a significant decrease from pre-treatment to post-treatment ($p<.004$). Additionally, all individual SCL-90-R scales except Hostility, Paranoid Ideation, and Phobic Anxiety showed significant improvement over time (Table 3). In the present study, there are several reasons why these three scales may not have showed significant change.

The chance for improvement on the scales of Hostility, Paranoid Ideation, and Phobic Anxiety might be less due to the pre-test scores. The pre-test mean on these three scales were low to begin with (Hostility 0.85, Paranoid Ideation 0.84 and Phobic Anxiety 0.69) compared to the pre-test mean scores for Anxiety (1.01), Depression (1.53), Obsessive-Compulsive (1.47), and Somatization (1.56). Therefore, there was less room for change on the Hostility, Paranoid Ideation, and Phobic Anxiety scales because of their lower initial scores.

Another explanation lies in the fact that one would not expect change on phobia, paranoia, and hostility because the treatment approach was designed primarily to change somatization, and feelings about one's pain condition, which are commonly reflected in anxiety and depression. The characteristics measured by the scales of Hostility, Paranoid Ideation, and Phobic Anxiety were not targeted in treatment. The lack of change on these scales serves as evidence for the discriminant validity of the treatment. Aspects of the patients' symptoms that were targeted for change, did change; those aspects of the patients' symptoms that were not targeted for change, did not change. Thus, change in the Somatization and Depression scales following treatment is not simply due to the passage of time. If all of scales had changed, one would suspect that patients might simply get better without any intervention.

Change on the Somatization scale exceeded the change on all other scales except the Depression scale. However, change on the Somatization scale was only significantly greater than changes on the Paranoid Ideation, Phobic Anxiety, and Psychoticism scales ($p < .05$). The effect sizes of the differences were small.

These findings suggest that a cognitive-behavioral approach to treatment of chronic pain may help patients gain better control over their current situation and help them feel less distressed in general. This finding is consistent with the proposal that a therapy program designed to restore function as well as to educate patients on proper pain coping mechanisms is an effective mode of treatment for these patients (Morley et al., 1999). The literature generally

supports the notion that due to the multitude of potential physiologic and psychosocial problems, a team approach to treatment may yield optimum treatment outcomes (Headley, 1994; Jenkins, 1999; Hankin et al., 2001). The findings of the current study provide support for the use of a multidisciplinary approach to treatment with chronic pain patients. Several authors believe that chronic pain patients can benefit greatly from a multidisciplinary approach to treatment (Fishbain et al., 1995; Fordyce, 1976; Philips, 1988). This belief was upheld and substantiated by the research findings.

Medical professionals should not restrict the use of the cognitive-behavioral approach only to the treatment of chronic pain patients. Many patients in acute pain begin a downward spiral if not properly directed by health care professionals. People in the health care field need to recognize when pain has gone beyond a patient's physical complaints and begins to affect a person's functional abilities, relationships, and mood. Proper referrals to other health care professionals may help prevent the downward slide into a chronic pain syndrome. Realistic expectations can be outlined for the patients so that they know what they can safely do, and when to progress their rehabilitation. Some patients are given restrictions for their activities, but then are never told when it is safe to move beyond these restrictions. Lack of physical activity and decreased mobility will cause secondary deconditioning effects, which can add to the original pain problem.

Even in athletic populations, there is reason for concern. Athletes tend to push themselves very hard physically. When they are unable to participate in

their sport due to an injury, they can become very anxious and depressed. They may have planned to go to college or be paid professionally for their abilities. Some may try to hasten their recovery, which could lead to greater problems. Others may deteriorate physically in areas unrelated to the injury as they try to recover by restricting their activity level to an excessive degree. Proper guidance and goal setting by a trained health care team can help athletes restore function and learn proper pain coping mechanisms to utilize during the recovery phase.

One goal of the current study was to determine whether patients with chronic pain had a unitary clinical presentation or whether there were meaningful subsets of respondents with distinct symptom profiles. The study attempted to determine if subgroups of chronic pain patients could be identified and replicated as in prior studies. The results of this study support the findings of investigators who have identified subgroup clusters of patients with chronic pain. Williams et al., (1995), using the SCL 90-R, were able to identify three subgroups of chronic pain patients. Their analysis of SCL 90-R scores differentiated patients into high, medium, and low scoring subgroup clusters. S-scores were analyzed separately for men and women. Patients in cluster one reported the highest level of psychological distress; those in cluster two a moderate level; and patients in cluster three a low level of distress.

Shutty and DeGood (1987) successfully identified three subgroups of patients using cluster analysis on 221 patients with chronic low-back pain based on the standardized scoring method (S-scores) of the Symptom Checklist-90R. The S-scores were analyzed separately by gender. The investigators found that

three clusters were most appropriate for both males and females to distinguish homogeneous groups.

A cluster analysis was performed on the total sample in the current research study (i.e., men and women combined). The results of the analysis indicated that a three-cluster solution was most appropriate, which is consistent with the prior studies. Thus, the cluster solution in the present study replicated a three-cluster solution similar to those reported by Shutty and DeGood (1987) and Williams et al. (1995).

One limitation of the study is that a measure of the severity of the disease is missing. At present, we do not know whether patients in Cluster 1 (the most distressed profile) had greater disease severity and more pain than did patients in the other two clusters. If indeed they were in more pain, it could be that their pain subsided during the treatment causing the decline (improvement) in their SCL-90-R scores. We have no way of knowing what aspect of the program might have effected the change observed. It may have been the behavioral aspect of the treatment that resulted in improved physical health and reduced pain levels (e.g., strength training, stretching exercises, aerobic conditioning and functional tasks). It may also have been the focus on cognitive changes associated with the management of chronic pain (e.g., improved sleep, diminished anxiety, and enhanced strategies for coping with pain). A future study focusing on a measure of disease severity may help clarify which aspect of the treatment program may effect the changes observed.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of the present investigation was to compare the pre- and post-treatment performance on the Global Severity Index (GSI) and the somatization psychological subscale of the SCL-90-R of 100 patients with chronic pain who successfully completed the Functional Recovery Program of Michigan. The study also attempted to determine if subgroups of chronic pain patients could be identified and replicated as in the study by Williams et al., (1995), based on their performance on the SCL-90-R.

Data were analyzed using nonparametric Wilcoxon signed-ranks tests. Analysis of the data indicated that the GSI score showed a significant decrease from pre-treatment to post-treatment ($p<.004$), thereby supporting the first hypothesis. In addition, performance on all individual SCL-90-R scales except the Hostility, Paranoid Ideation, and Phobic Anxiety scales showed significant improvement over time.

The Somatization scale change scores were analyzed using multivariate repeated-measures ANOVA, with SCL-90-R scale scores as a within-subject factor. Post hoc tests employed simple paired contrasts to compare the change on each of the SCL-90-R scales relative to change on the Somatization scale. The results indicated that the change on the Somatization scale exceeded change on all scales except the Depression scale. Change on the Somatization

scale was significantly greater than changes on the Paranoid Ideation, Phobic Anxiety, and Psychoticism scales ($p < .05$), but not significantly greater than the changes on the Anxiety, Interpersonal Sensitivity, and Obsessive-Compulsive scales, with a trend on Hostility ($p = .099$). The fact that the Somatization and Depression scales had the most significant change is not surprising considering that they are most closely linked to a patient's distress level. These scales had more room to show change because of the level of elevation displayed on initial evaluation compared to the other symptom dimensions. Also, because the treatment was targeted at reducing a patient's distress level and help them to better cope with their situation, one would expect these scales to change. These results provided partial support for the second hypothesis.

One goal of this study was to determine whether chronic pain patients had a unitary clinical presentation or whether there were meaningful subsets of respondents with distinct symptom profiles. In the present study, cluster analyses were used delineate groups of participants who produced similar symptom profiles on the SCL-90-R. A two-step approach employing both hierarchical and non-hierarchical methods of cluster analysis was used to segment the patient sample. The first step used a hierarchical technique (Ward's minimum variance method using squared Euclidean distances) to establish the most appropriate number of clusters and to identify any obvious outliers. The second step in the analysis involved a non-hierarchical, nodal clustering method (*k*-means). Overall, the analyses for both men and women yielded three-cluster solutions similar to those reported by Shutty and DeGood (1987) and Williams et

al. (1995). These results affirmed the third hypothesis.

Conclusions

The following conclusions are drawn from the data within the limitations of this study:

1. Patients who successfully completed the Functional Recovery Program of Michigan showed a significant decrease on the GSI score of the SCL-90-R from pre-treatment to post-treatment.

2. There was a significant improvement from pre-treatment to post-treatment on all individual SCL-90-R scores except Hostility, Paranoid Ideation, and Phobic Anxiety. The characteristics measured by those scales were not targeted in treatment. It would not be expected that these scales would change, and the lack of change serves as evidence for discriminant validity of the treatment.

3. Performance changes on the Somatization scale from pre-treatment to post-treatment exceeded changes on all other scales except the Depression score.

4. Performance changes on the Somatization scale from pre-treatment to post-treatment was significantly greater than the changes on the PAR, Phobic Anxiety, and Psychoticism scales.

5. The three-cluster solutions derived for both men and women with chronic pain are similar to those reported by Shutty and DeGood (1987) and Williams et al. (1995).

Recommendations

The following suggestions are offered for future research on the topic investigated in this study:

1. In this study, the data collected were from patients with chronic pain whose treatment costs were covered by workers compensation and automobile insurance. Because patients were receiving compensation in some form from the workers compensation and

automobile insurances, secondary gain issues (e.g., continuation of medical and healthcare benefits, disability claims on autos and credit cards) could have influenced responses to the SCL-90-R and apparent treatment outcomes. Replication of the study should include patients with other insurance coverage to assess if secondary gain played a role in the findings of this study.

2. The current study did not address what aspect of the treatment program might have effected the observed changes. Future studies may want to focus on a measure of disease severity in a patient's profile, and/or examine the patients' perceptions of the effectiveness of various aspects of the treatment program.

3. Because all of the SCL-90-R scores changed except Hostility, Paranoid Ideation, and Phobic Anxiety, it is recommended that future research focus on personality traits that are more resistant to change, such as paranoia and phobia. The current method of treatment was not targeted at changing characteristics measured by these scales. Future treatment may want to focus more on modifying personality traits to see if treatment outcomes are affected.

4. Future studies may want to focus on factors that may have contributed to the large variance in the present population. Some possibilities include assessing differences in age, the number of months since the injury occurred, and nature of occupation.

5. The participants in Cluster 1 and 2 were significantly more likely to have multiple pathonomonic signs than were patients in Cluster 3. Also, patients in Cluster 1 were more likely to have an attorney than were patients in Clusters 2 and 3. Do persons with multiple comorbid conditions or persons in the process of litigation perform differently on the SCL-90-R than other pain patients? Do they respond differently to cognitive-behavioral treatment?

6. The participants in the present study were limited in number. It is recommended that a large number (e.g., several hundred) of subjects be studied to determine if a 3-cluster solution is still the most appropriate for patients with chronic pain.

7. This study did not analyze whether one cluster group responded differently to a cognitive-behavioral approach to chronic pain treatment than another cluster. Future research should examine the response of various cluster groups to the treatment program.

The response of gender-specific cluster groups to treatment should also be examined.

8. An analysis of patient "readiness to change" based on the transtheoretical model of behavior change (Kerns & Rosenberg, 2000) may provide predictive information on the response of patients to treatment, which could then be compared to treatment outcomes.

9. In this study, participants were not asked what aspects of the treatment program, if any, helped them the most. In future research, a post-treatment interview should be held to gather this information from the patients.

APPENDIX A

CONSENT FOR TREATMENT

DMC

Wayne State University

Sinai-Grace Hospital - JCC
Functional Recovery Program
6600 West Maple Road
West Bloomfield, Michigan
48322

Outpatient Consent Form

Name: _____ Social Security #_____

1. **CONSENT**: I consent to medical care including routine procedures, examinations, tests, immunization, regional and local anesthesia and other treatment by Dr./ Service_____and his/her assistants, associates or consultants as is necessary in their judgement. I realize that the clinic is a teaching facility affiliated with Wayne State University and the Detroit Medical Center and consent to medical care being performed by students, residents, physician extenders or medical support staff. I consent to the testing and disposal of specimens of my blood, urine and other bodily fluids, tissues and products. I understand that an HIV (human-immuno) deficiency virus test may be done upon me without my further consent if a doctor, health professional or employees sustains a percutaneous, mucous membrane or open wound exposure to my blood or other bodily fluid.

2. **ADDITIONAL CONSENT FORMS**: I understand that for certain procedures deemed necessary by my physician(s), I will be required to sign a special consent form. Further, if I do not fully understand a procedure or its risks, consequences and alternative methods of treatment, I have the right to question the appropriate health care professionals.

3. **RELEASE OF INFORMATION**: The clinic and each provider who treats me may release to whomever is potentially responsible for payment and/or subsequent treatment, information from my medical and/or financial records as necessary or desirable for my care or for the clinic and/or provider to obtain payment for audits of such payments. This authorization includes all records, including records of mental health and substance abuse services, treatment AIDS, HIV infection, AIDS Related Complex, and Hepatitis.

This authorization for release shall be effective for five (5) years from the date of this consent unless a revocation or authorization in writing is filed at the clinic to terminate this authorization. Such revocation is prospective and not retrospective, and only applies to release of information for other than to obtain payment.

4. **INSURANCE**: I authorize the doctor and the staff to review my insurance coverage with my insurance company. I certify that any and all information provided by me in furtherance of my application for health care benefits are true. I authorize payment of insurance benefits to me made directly to the doctor. I agree to pay in full any and all charges not covered by insurance or other benefits.

5. **NO GUARANTEES**: I understand that the practice of medicine is not an exact science and that no guarantees or promises have been made to me as a result of treatments or examinations by the doctors or assistants.

I HAVE READ THIS FORM. IT HAS BEEN FULLY EXPLAINED TO ME, AND ALL OF MY QUESTIONS ABOUT IT HAVE BEEN ANSWERED. I UNDERSTAND ITS CONTENTS.

_____ _____

PATIENT SIGNATURE DATE PATIENT'S GUARDIAN SIGNATURE DATE

_____

WITNESS DATE

APPENDIX B

PERSONAL DATA AND INTERVIEW SHEET

Sinai-Grace Hospital
Detroit Medical Center / Wayne State University

Functional Recovery Program
8600 West Maple Road
Suite 333
West Bloomfield, MI 48322
248-661-9903 Phone
248-661-9906 Fax

Date _____

Full Legal Name of Patient _____

Address _____, _____ MI (Zip) _____

Telephone: Home (___) ___-____ Work (___) ____-____ x____ FAX _____

Age _____ Birth Date _____ Birthplace _____

Sex: (__) Male (__) Female Patient's Social Security Number ___-__-____

Current Marital Status: (__) Never Married (__) Married
(__) Separated (__) Divorced (___) Widowed

What is the last grade you completed in school? _____ Where? _____

Armed Forces experience? ____ What branch? _____ Rank _____ M.O.S. _____

Who referred you here? _____

Why was this evaluation requested? _____

Who is your personal physician? _____

Office address _____ Telephone number (___) ____-____

When did you last see a physician? _____

For what reason? _____

Check all items which describe your current living situation:
(_) Alone (_) With spouse–first name _____
(_) With children (_) With brother or sisters
(_) With in-laws (_) With your parents
(_) With others (roommate, share apartment, etc) _____

Number of children ___ Ages of children _____

Names of children living at home _____

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PERSONAL DATA–Page 2

Are you presently employed? Yes __ No __

What is your specific occupation? _____

Briefly describe what you do: _____

The name of your place of employment? _____

How long have you worked for this employer? _____

If disabled or unemployed, when injured? _____ last employed? _____

Do you have an attorney representing you regarding your injury?

Name _____ Telephone (____) ___-____

Address _____, MI _____

What is your current source of financial support? _____

Briefly describe problems which are of current concern to you:

_____

_____

_____

Have you ever received treatment for nervous or emotional difficulties? Yes __ No __
If yes, please indicate when, the problems you were experiencing, and the agency or psychotherapist who treated you:

_____

_____

Have you ever taken psychological tests? Yes __ No __ If yes, when and where?

_____

_____

What are your goals for entering the Functional Recovery Program? _____

_____

_____

PERSONAL DATA–Page 3

What medications are you currently taking for nervousness, pain, sleep, depression, or other conditions?

NAME OF MEDICATION	DOSAGE	# TIMES PER DAY	DATE STARTED	WHO PRESCRIBED	PURPOSE
1					
2					
3					

Current intake of beer, wine, or whiskey each day: _____ drinks

Current intake of caffeine (tea/coffee/soda) each day:_____ drinks

Current usage of tobacco each day: _____

Please check any of the following symptoms or sensations which apply to you these days:

( ) Headaches
( ) Migraine headaches
( ) Muscle tension headaches
( ) Sinus headaches
( ) Dizzy spells
( ) Fainting
( ) Heart palpitations
( ) High blood pressure (_____/_____)
( ) Stomach ulcer
( ) Frequent indigestion
( ) Loss of appetite
( ) Rapid weight loss
( ) Increased appetite
( ) Rapid weight gain
( ) Over weight (___ pounds)
( ) Diarrhea
( ) Constipation
( ) Diabetes
( ) Hypoglycemia
( ) Seizures or spells
( ) Tooth aches
( ) Teeth grinding
( ) Jaw pain
( ) Jaw clenching
( ) Financial worries
( ) Problems at home
( ) Loss of interest in sex
( ) Other sexual concerns

( ) Tired most of the time
( ) Unable to get to sleep
( ) Wake up too early
( ) Wake up frequently
( ) Wake up without feeling rested
( ) Nightmares (about _____?)
( ) Unpleasant dreams
( ) Sensitive to bright lights
( ) Sensitive to loud noise
( ) Feeling tense
( ) Feeling frightened
( ) Feeling sad
( ) Feeling like crying
( ) Loss of interest in socializing
( ) Feeling irritable
( ) Worry much of the time
( ) Loss of desire to live
( ) Unable to enjoy life
( ) Dislike weekends or vacations
( ) Shy around other people
( ) Uncomfortable in crowds
( ) Difficult to make friends
( ) Unable to relax
( ) Problems making decisions
( ) Difficult to concentrate
( ) Negative thoughts about myself
( ) Chronic pain _____
( ) Other _____
( ) Other _____

APPENDIX C

SAMPLE SCL-90 R INSTRUMENT

SCL-90-R®

Symptom Checklist-90-R

Leonard R. Derogatis, PhD

MICROTEST Q™
Assessment System

NAME (Optional) _____

_____

IDENTIFICATION NUMBER

0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9

BIRTH DATE

MONTH		DAY		YEAR			
0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2
	3	3	3		3	3	3
	4		4		4	4	4
	5		5		5	5	5
	6		6		6	6	6
	7		7		7	7	7
	8		8		8	8	8
	9		9		9	9	9

DIRECTIONS:

1. When you record your responses on this answer sheet, use a No. 2 pencil only, and fill in the circles with a heavy, dark mark.
2. Print your identification number in the box to the left. Then find the circle below each space that has the same number and blacken it. In a similar way, complete the Birth Date and Test Date boxes.
3. Blacken the appropriate circle for your gender.
4. If you want to change a response, erase it carefully and then fill in your new choice.
5. Do not make any marks outside the circles.

TEST DATE

MONTH	DAY	YEAR
0 0	0 0	0 0 0 0
1 1	1 1	1 1 1 1
2	2 2	2 2 2 2
3	3 3	3 3 3
4	4	4 4 4
5	5	5 5 5
6	6	6 6 6
7	7	7 7 7
8	8	8 8 8
9	9	9 9 9

GENDER

① Male
② Female

80

National Computer Systems P. O. Box 1416 Minneapolis MN 55440 800-627-7271 www.ncs.com

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"MICROTEST Q" is a trademark and the NCS logo is a registered trademark of National Computer Systems, Inc.

Product Number
51417

100584

PLEASE DO NOT MARK IN THIS AREA

INSTRUCTIONS:

Below is a list of problems people sometimes have. Please read each one carefully, and blacken the circle that best describes HOW MUCH THAT PROBLEM HAS DISTRESSED OR BOTHERED YOU DURING THE PAST 7 DAYS INCLUDING TODAY. Blacken the circle for only one number for each problem and do not skip any items. If you change your mind, erase your first mark carefully. Read the example before beginning, and if you have any questions please ask them now.

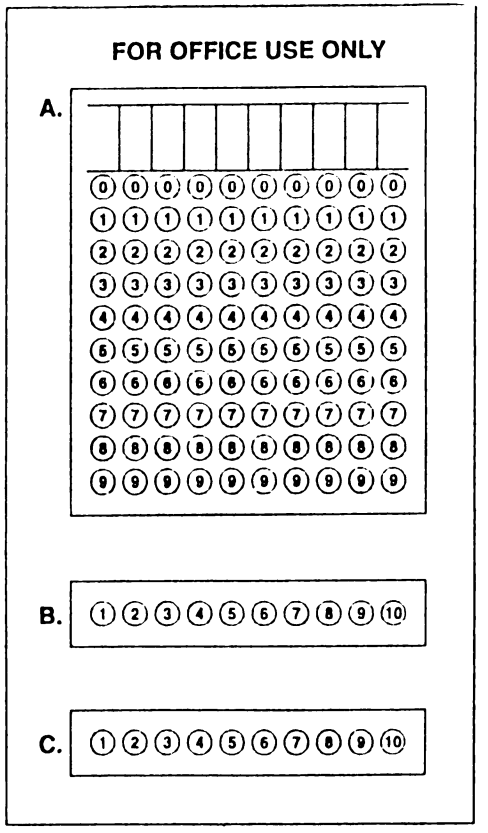
	NOT AT ALL	A LITTLE BIT	MODERATELY	QUITE A BIT	EXTREMELY	EXAMPLE HOW MUCH WERE YOU DISTRESSED BY:
1	⓪	①	②	●	④	Bodyaches

	NOT AT ALL	A LITTLE BIT	MODERATELY	QUITE A BIT	EXTREMELY	HOW MUCH WERE YOU DISTRESSED BY:
1	⓪	①	②	③	④	Headaches
2	⓪	①	②	③	④	Nervousness or shakiness inside
3	⓪	①	②	③	④	Repeated unpleasant thoughts that won't leave your mind
4	⓪	①	②	③	④	Faintness or dizziness
5	⓪	①	②	③	④	Loss of sexual interest or pleasure
6	⓪	①	②	③	④	Feeling critical of others
7	⓪	①	②	③	④	The idea that someone else can control your thoughts
8	⓪	①	②	③	④	Feeling others are to blame for most of your troubles
9	⓪	①	②	③	④	Trouble remembering things

10	0	1	2	3	4	Worried about sloppiness or carelessness
11	0	1	2	3	4	Feeling easily annoyed or irritated
12	0	1	2	3	4	Pains in heart or chest
13	0	1	2	3	4	Feeling afraid in open spaces or on the streets
14	0	1	2	3	4	Feeling low in energy or slowed down
15	0	1	2	3	4	Thoughts of ending your life
16	0	1	2	3	4	Hearing voices that other people do not hear
17	0	1	2	3	4	Trembling
18	0	1	2	3	4	Feeling that most people cannot be trusted
19	0	1	2	3	4	Poor appetite
20	0	1	2	3	4	Crying easily
21	0	1	2	3	4	Feeling shy or uneasy with the opposite sex
22	0	1	2	3	4	Feelings of being trapped or caught
23	0	1	2	3	4	Suddenly scared for no reason
24	0	1	2	3	4	Temper outbursts that you could not control
25	0	1	2	3	4	Feeling afraid to go out of your house alone
26	0	1	2	3	4	Blaming yourself for things
27	0	1	2	3	4	Pains in lower back
28	0	1	2	3	4	Feeling blocked in getting things done
29	0	1	2	3	4	Feeling lonely
30	0	1	2	3	4	Feeling blue
31	0	1	2	3	4	Worrying too much about things
32	0	1	2	3	4	Feeling no interest in things
33	0	1	2	3	4	Feeling fearful
34	0	1	2	3	4	Your feelings being easily hurt
35	0	1	2	3	4	Other people being aware of your private thoughts
36	0	1	2	3	4	Feeling others do not understand you or are unsympathetic
37	0	1	2	3	4	Feeling that people are unfriendly or dislike you

	NOT AT ALL	A LITTLE BIT	MODERATELY	QUITE A BIT	EXTREMELY	HOW MUCH WERE YOU DISTRESSED BY:
38	0	1	2	3	4	Having to do things very slowly to insure correctness
39	0	1	2	3	4	Heart pounding or racing
40	0	1	2	3	4	Nausea or upset stomach
41	0	1	2	3	4	Feeling inferior to others
42	0	1	2	3	4	Soreness of your muscles
43	0	1	2	3	4	Feeling that you are watched or talked about by others
44	0	1	2	3	4	Trouble falling asleep
45	0	1	2	3	4	Having to check and double-check what you do
46	0	1	2	3	4	Difficulty making decisions
47	0	1	2	3	4	Feeling afraid to travel on buses, subways, or trains
48	0	1	2	3	4	Trouble getting your breath
49	0	1	2	3	4	Hot or cold spells
50	0	1	2	3	4	Having to avoid certain things, places, or activities because they frighten you
51	0	1	2	3	4	Your mind going blank
52	0	1	2	3	4	Numbness or tingling in parts of your body
53	0	1	2	3	4	A lump in your throat
54	0	1	2	3	4	Feeling hopeless about the future
55	0	1	2	3	4	Trouble concentrating
56	0	1	2	3	4	Feeling weak in parts of your body
57	0	1	2	3	4	Feeling tense or keyed up
58	0	1	2	3	4	Heavy feelings in your arms or legs
59	0	1	2	3	4	Thoughts of death or dying
60	0	1	2	3	4	Overeating
61	0	1	2	3	4	Feeling uneasy when people are watching or talking about you
62	0	1	2	3	4	Having thoughts that are not your own
63	0	1	2	3	4	Having urges to beat, injure, or harm someone

64	(0)	(1)	(2)	(3)	(4)	Awakening in the early morning
65	(0)	(1)	(2)	(3)	(4)	Having to repeat the same actions such as touching, counting, or washing
66	(0)	(1)	(2)	(3)	(4)	Sleep that is restless or disturbed
67	(0)	(1)	(2)	(3)	(4)	Having urges to break or smash things
68	(0)	(1)	(2)	(3)	(4)	Having ideas or beliefs that others do not share
69	(0)	(1)	(2)	(3)	(4)	Feeling very self-conscious with others
70	(0)	(1)	(2)	(3)	(4)	Feeling uneasy in crowds, such as shopping or at a movie
71	(0)	(1)	(2)	(3)	(4)	Feeling everything is an effort
72	(0)	(1)	(2)	(3)	(4)	Spells of terror or panic
73	(0)	(1)	(2)	(3)	(4)	Feeling uncomfortable about eating or drinking in public
74	(0)	(1)	(2)	(3)	(4)	Getting into frequent arguments
75	(0)	(1)	(2)	(3)	(4)	Feeling nervous when you are left alone
76	(0)	(1)	(2)	(3)	(4)	Others not giving you proper credit for your achievements
77	(0)	(1)	(2)	(3)	(4)	Feeling lonely even when you are with people
78	(0)	(1)	(2)	(3)	(4)	Feeling so restless you couldn't sit still
79	(0)	(1)	(2)	(3)	(4)	Feelings of worthlessness
80	(0)	(1)	(2)	(3)	(4)	The feeling that something bad is going to happen to you
81	(0)	(1)	(2)	(3)	(4)	Shouting or throwing things
82	(0)	(1)	(2)	(3)	(4)	Feeling afraid you will faint in public
83	(0)	(1)	(2)	(3)	(4)	Feeling that people will take advantage of you if you let them
84	(0)	(1)	(2)	(3)	(4)	Having thoughts about sex that bother you a lot
85	(0)	(1)	(2)	(3)	(4)	The idea that you should be punished for your sins
86	(0)	(1)	(2)	(3)	(4)	Thoughts and images of a frightening nature
87	(0)	(1)	(2)	(3)	(4)	The idea that something serious is wrong with your body
88	(0)	(1)	(2)	(3)	(4)	Never feeling close to another person
89	(0)	(1)	(2)	(3)	(4)	Feelings of guilt
90	(0)	(1)	(2)	(3)	(4)	The idea that something is wrong with your mind



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PLEASE DO NOT MARK IN THIS AREA

APPENDIX D

AGREEMENT TO PARTICIPATE IN THE FUNCTIONAL RECOVERY PROGRAM

Sinai-Grace Hospital
Detroit Medical Center / Wayne State University

DMC/SINAI–GRACE HOSPITAL
FUNCTIONAL RECOVERY PROGRAM OF MICHIGAN
AGREEMENT TO PARTICIPATE

I, _____, voluntarily agree to attend and participate in all aspects of the DMC/Sinai–Grace Hospital's Functional Recovery Program which include the physical, psychological and educational sessions. The purpose of the program is to learn strategies to return to functioning and manage pain. I understand that functioning may return before pain is relieved. Following are the steps I need to take to maximize my benefits and complete the program:

1. I realize that I must have a positive attitude towards the program and the treatment approach. Remaining positive will allow the greatest benefit from treatment. If I have concerns about the treatment, the treatment staff, or my pain related problems, I understand that I should bring those concerns to the attention of the staff and not the other patients. I agree that I will not discuss these concerns with the other patients. The Rules of Common Courtesy details this expectation and I have reviewed the Rules of Common Courtesy.

2. I agree to set baselines for functioning and gradually increase my activity level based on the task goal identified. I realize that I should not try to do more than my goal on a good day or less than my goal on a bad day.

3. Consistency of treatment is essential for success. Therefore, I agree to attend my scheduled sessions. The attendance policy details this expectation and I have reviewed the attendance policy.

4. I will carry over my increased activity level in my home environment. Therefore, participation by my family or significant other is expected and I will make every effort to have them participate in the program, when appropriate.

5. I am aware that during the period of time that I am in the program, my treating physician for my pain problem is Dr. Ellenberg. I will not treat with another physician during my stay in the program for my pain problem. If I am taking narcotic medication for my pain, I understand that I will need to wean off of the narcotics per the prescribed weaning schedule.

6. I understand that at my discharge conference I will be given a set of recommendations to continue to increase my flexibility, strength and endurance and manage pain as I return to functioning. At that time I will also be given a set of abilities that apply for my home, recreation and employment activities.

To maximize my benefits and successfully complete the program, I understand that all parts of this agreement must be followed. I understand that failure to comply with this agreement could result in discharge from the program.

Signed:_____ Date:_____

FRP Staff:_____ Date:_____

APPENDIX E

APPROVAL LETTER FROM THE UNIVERSITY COMMITTEE ON RESEARCH INVOLVING HUMAN SUBJECTS

MICHIGAN STATE
UNIVERSITY

August 13, 2001

TO: John HAUBENSTRICKER
213 IM Sports Circle
MSU

RE: **IRB# 01-531** CATEGORY: EXEMPT 1-E
APPROVAL DATE: August 7, 2001

TITLE: OUTCOME MEASURES OF CHRONIC PAIN PATIENTS ON THE SYPTOMS CHECKLIST (SCL 90 R) AFTER COMPLETION OF A COGNITIVE-BEHAVORIAL TREATMENT PROGRAM.

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete and I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the **UCRIHS approved this project.**

RENEWALS: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Projects continuing beyond one year must be renewed with the green renewal form. A maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for a complete review.
REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB# and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.
PROBLEMS/CHANGES: Should either of the following arise during the course of the work, notify UCRIHS promptly: 1) problems (unexpected side effects, complaints, etc.) involving human subjects or 2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of further assistance, please contact us at (517) 355-2180 or via email: UCRIHS@msu.edu. Please note that all UCRIHS forms are located on the web: http://www.msu.edu/user/ucrihs

Sincerely,

Ashir Kumar, M.D.
UCRIHS Chair

AK: bd

cc: Maureen Walczyk
708 Kingsley Circle
Wixom, MI 48393

OFFICE OF
RESEARCH AND GRADUATE STUDIES

University Committee on Research Involving Human Subjects

Michigan State University
246 Administration Building
East Lansing, Michigan
48824-1046

517/355-2180
FAX: 517/353-2976
cc: www.msu.edu/user/ucrihs
E-Mail: ucrihs@msu.edu

The Michigan State University IDEA is Institutional Diversity Excellence in Action

MSU is an affirmative-action, equal-opportunity institution

APPENDIX F

FUNCTIONAL RECOVERY PROGRAM
SAMPLE SCHEDULE

DMC--SINAI GRACE HOSPITAL

FUNCTIONAL RECOVERY PROGRAM

PROGRAM INFORMATION

1) *WHAT IS THE FUNCTIONAL RECOVERY PROGRAM (FRP)?*

The FRP is a 21 day state of the art out patient rehabilitation program, designed to improve functioning and help individuals with chronic, non-malignant pain. We are a comprehensive integrated adult pain management program.

The program is housed in the Jewish Community Center, a premiere health club setting. The emphasis is treatment of the whole person, utilizing stretching, aerobic, and strengthening exercises. Pool therapy, psychological support services, and adapted recreation groups are also included. A series of 21 different education sessions are provided in conjunction with treatment to assist with returning to a pre-injury lifestyle. Individuals who successfully complete the program have the skills and knowledge needed to continue their recovery independently.

Individuals with pain of three months or more may be candidates. Individuals must be motivated to function and participate voluntarily. Rather than waiting for the pain to stop and then return to functioning, the FRP philosophy is to gradually return to activities, which will eventually allow the pain to become less intense over a six to nine month period of time. A Program Agreement between patient and staff form the basis for understanding the expected benefits and method of treatment. (See attached).

2) *WHAT ARE THE CRITERIA FOR ADMISSION?*

Appropriate candidates are 18 years of age or older and are:

1. Willing to complete the assessment process.
2. Able to comprehend and communicate to allow program participation.
3. Experiencing chronic, non-malignant pain of three months or more duration.
4. Experiencing a reduction in their vocational and avocational activities.
5. Willing to sign the Program Agreement.
6. Not utilizing proper coping strategies.
7. Reporting or demonstrating mild to moderate emotional distress.
8. Willing to work toward stated goals.
9. Medically stable.

3) *HOW IS AN INDIVIDUAL EVALUATED FOR THE FRP?*

Individuals referred to the FRP complete a three step assessment.

1. Evaluation by our medical director.
2. Psychological screening with our neurorehabilitation psychologist and tour of the Functional Recovery Program.
3. Pre-admission team conference to discuss treatment recommendations and individual interest in pursuing admission.

4) *HOW IS A REFERRAL MADE?*

Contact the Vocational Counselor at (248) 661-9903 to schedule an evaluation and check on insurance coverage. Referrals are accepted from patients, physicians, nurse case managers, or insurance adjusters.

5) *WHAT ABOUT MEDICATIONS AND PHYSICIAN EVALUATION?*

While in treatment at the FRP, all pain related medications are supervised/directed by the medical director. Other medications not related to pain (ie–blood pressure medication) may be prescribed by your primary care physician. Patients are gradually weaned off narcotics in order to restore the body's natural ability to respond to pain.

Narcotic medications act on the brain and spinal cord to reduce the perception of pain. When used for prolonged periods of time for chronic pain, narcotics can be addicting. They also inhibit the production of endorphins, (powerful pain-killing chemicals we naturally produce).

We ask that patients not seek outside medical care for their pain problem while they are in treatment in the FRP. Every effort is made to coordinate services with other treating physicians while the patient is under our care.

Once treatment is discontinued, there is a reduction in the need for medical care and follow up. Our medical director is available for short term follow up. Patients may also elect to follow up with their referring physician.

6) *IS THERE FAMILY INVOLVEMENT?*

This type of disorder usually affects the family as well as the patient. To assist in return to health the family is a vitally important element. We welcome and encourage the involvement of family members/significant others. Opportunities for family involvement are encouraged at the weekly team conferences and on treatment days with staff approval. The program psychologist is also available to work with significant others dealing with the patients pain problem.

7) *WILL MY PAIN BE GONE AFTER SEVEN WEEKS?*

We don't expect it to be gone completely by discharge. Long term pain reduction is reported six to nine months post-discharge once a normalized life is resumed. Ninety-three percent of patients indicated that they were satisfied with services received at the FRP in 1995. However, even though there may be continuing discomfort, individuals have improved coping and functional ability.

8) *WHAT CAN BE EXPECTED UPON COMPLETION OF THE PROGRAM?*

Return to a normal lifestyle; improved function; improved tolerance for social, recreational and vocational goals. Individual patient goals are realized; improved sleep, stress management, overall functioning, etc. . .

Patients completing the FRP can do 30 minutes of aerobic exercise, a complete set of strengthening exercises, have increased flexibility, and normal gait (walking) patterns. In order to continue successful lifestyle management and relapse prevention, patients will need to continue with an independent exercise program to include stretches, strength training, aerobic exercises, and other techniques.

9) *IS THERE ASSISTANCE WITH TRANSPORTATION AND HOUSING?*

If transportation is a problem, Jewish Family Service provides rides to and from locations in Wayne, Oakland and Macomb counties. There are several low to moderate cost hotels in the area for patients who live too far to drive daily.

Assistance with these arrangements can be obtained by contacting the program.

10) *WHAT IS THE DAILY SCHEDULE LIKE?*

The FRP meets for 21 treatment days, over seven weeks. Treatment is provided on Monday, Wednesday and Friday. In addition a weekly team conference is held every Thursday along with stretches and aerobics. The team conferences are a very important part of the Program, as progress towards goals are reviewed and modified with the patient, family and treatment team. See the attached sample schedule.

11) *WHO ARE THE STAFF MEMBERS?*

The Functional Recovery Program Staff are highly trained and experienced professionals who have been sub-trained in the specialty of chronic pain. Staff include the medical director (physician), neurorehabilitation psychologist, physical therapist, occupational therapist, vocational counselor and support staff.

SAMPLE SCHEDULE

MONDAY -- WEDNESDAY -- FRIDAY

Morning program hours are: 8:00 AM to 12:00 PM

Afternoon program hours are: 10:00 AM to 2:00PM

8:00 AM	Morning exercise (stretches, weights, aerobic exercise)
9:00 AM	Morning individual psychology meetings.*
10:00 AM	Education Group #1
11:00 AM	Track (walking)
11:15 PM	Pool exercises/Recreational activity
12:00 PM	Morning program ends/Afternoon exercise
1:00 PM	Afternoon individual psychology meeting *
2:00 PM	Afternoon program ends

* **Patients may need to add 30 minutes one day per week in order to meet individually with the psychologist.**

SAMPLE SCHEDULE

THURSDAY MORNINGS

Fifteen minute meeting for team conference with patient, family and treatment team.

Stretching exercises.

Aerobic exercise.

Total time: About one hour.

ptinforma.doc

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