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FACTORS THAT PREDICT TREATMENT CLINIC REFERRAL

AND

RETURN TO WORK IN PERSONS WITH CHRONIC LOW BACK PAIN

BY

SHERRY MENGERING 

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

DEPARTMENT OF PHYSICAL THERAPY

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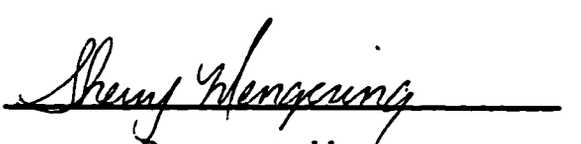

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled, "Factors that predict treatment clinic referral and return to work in persons with chronic low back pain", submitted by Sherry Mengering in partial fulfillment of the requirements for the degree of Master of Science in Physical Therapy.

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ABSTRACT

The purpose of this study was to determine whether characteristics of persons with chronic low back pain influence the type of rehabilitation facility to which they are referred, the length of treatment, and the return to work status following rehabilitation. Subjects were 124 individuals who had attended a multidisciplinary rehabilitation clinic or a physical therapy clinic for the treatment of chronic low back pain.

Multiple regression analyses (both step-wise and forced-entry) were conducted in order to assess the relationships. The independent variables included in the prediction of clinic attended included: previous rehabilitation and work absence (r^2=.191). The length of treatment was influenced by: pain-focused behavior and source of funding (r^2=.124). Return to work status was predicted by: work absence, pain-focused behavior, clinic attended, age, and occupation (r^2=.640). Significantly more subjects from the physical therapy clinic (59.0%) returned to their previous employment than those from the multidisciplinary clinic (15.9%).

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CHAPTER ONE

THE PROBLEM

Introduction

Low back pain is a relatively common condition in industrialized countries. In the United States, the annual incidence rate has been estimated at 5% of the adult population, while the lifetime incidence ranges from 60%-80% (Frymoyer & Cats-Baril, 1991). Historically, back pain has existed for many years and it is unlikely that the prevalence of back symptoms has changed (Frymoyer & Cats-Baril, 1991). There is no evidence to suggest that mankind suffers from more back pain now than ever before, however the prevalence of low back pain disability in developed countries has increased exponentially in the last 30 years. With increasing rates of disability, the costs associated with the management of persons with low back pain disability have increased dramatically.

While back pain is common, and typically associated with periods of restricted activity due to pain, the great majority of persons resume normal activity within days of pain onset. Mayer et al. (1991) found that 80% of people with non-specific low back pain returned to function within two weeks, while fewer than 10% required five months or longer. Fordyce (1995) estimated that only 2-5% of persons who suffer from low back pain will eventually develop chronic low back pain and its associated disability. Despite this relatively small group, chronic low back pain accounts for billions of dollars spent annually on direct and indirect costs associated with the condition. Diagnostic procedures, surgery, rehabilitation, lost time at work, compensation payments, and other medical costs account for an estimated $20 billion per year in the United States (Frymoyer & Cats-Baril, 1991). Further costs are associated with lost productivity in the workplace. While there are no figures available for Alberta at this time, estimates indicate that costs to Alberta Health Care for the medical management of these clients, insurance payments, and WCB payments amount to millions of dollars annually in the province (Gross, 1996).

Various factors have been correlated with prolonged disability in clients with low back pain. Clients who possess certain characteristics that have been associated with prolonged disability have been shown to have difficulty recovering to their previous level of function and specifically, returning to the workplace. If these persons could be identified early on in their condition, it may be possible to target treatment towards those at risk for prolonged disability. These clients could be provided, as indicated, with comprehensive rehabilitation to address the multi-dimensional nature of chronic pain.

Persons diagnosed with chronic low back pain and resulting disability present a challenge to physical therapists who typically play a central role in the management of these clients. There is increasing pressure to manage these clients in an efficient and cost-effective manner in order to avoid prolonged disability and loss of productivity in the workplace.

In Alberta at the present time, there are a number of rehabilitation options available for clients with chronic low back pain. Traditionally, clients received physical therapy in outpatient physical therapy clinics. However, more recently, multidisciplinary rehabilitation clinics have been gaining acceptance as the treatment of choice for persons with chronic low back pain. Some of the factors that influence referral to private physical therapy clinics were examined by Ehrmann-Feldman et al. (1996). However, the factors that affect the referral to multidisciplinary rehabilitation clinics have not been examined. Furthermore, the relationship between the type of treatment clinic attended and return to work outcome has not been examined.

Objectives of the Study

At the present time it is not known whether the characteristics of persons with chronic low back pain affect the rehabilitation clinic to which they are referred. Two approaches to rehabilitation for these clients (physical therapy and multidisciplinary clinics) are frequently used in Alberta. Whether the clients from the two types of clinics

differ based on their characteristics or their return to work status following rehabilitation is not known. In addition, the two approaches to rehabilitation have not been examined with respect to the length of treatment that they provide to persons with chronic low back pain. The objectives of the study were as follows (see Figure 1):

1) To examine the relationship between a set of client characteristics (independent variables) and treatment clinic referral for persons with chronic low back pain.
2) To examine the relationship between the clinic attended and return to work status following rehabilitation for persons with chronic low back pain.
3) To examine the relationship between client characteristics and return to work in persons with chronic low back pain.
4) To examine the relationship between the clinic attended and the length of treatment.
5) To examine the relationship between the client characteristics and the length of treatment for persons with chronic low back pain.
6) To examine the relationship between the length of treatment and return to work for persons with chronic low back pain.

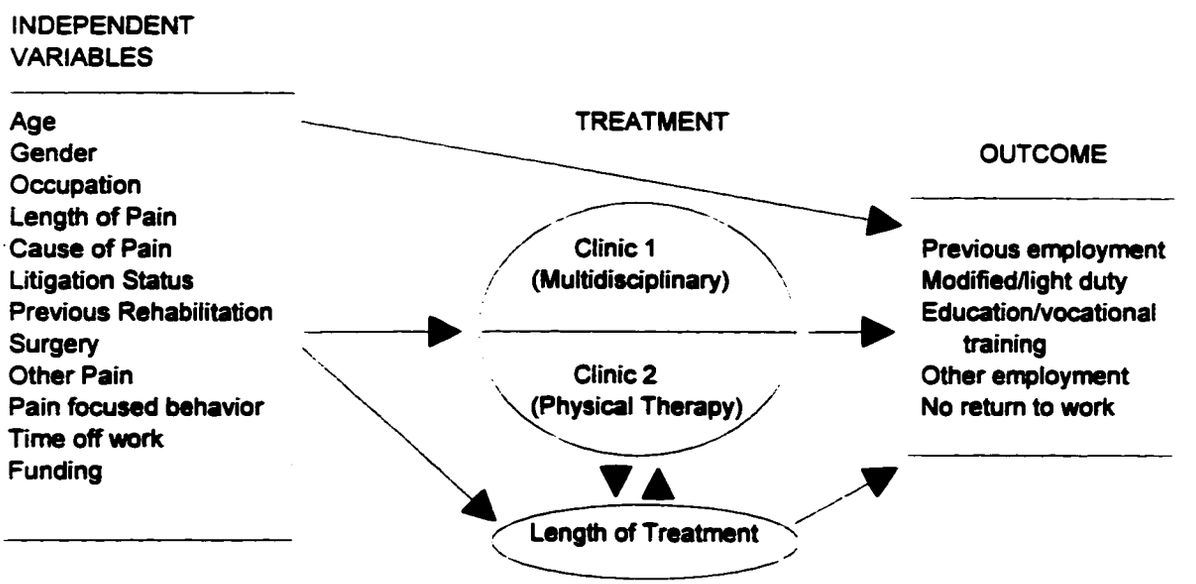

Figure 1: The model showing the relationships that were examined in the study.

Research Hypothesis

The literature indicates that multidisciplinary clinics are frequently the treatment of last resort for the rehabilitation of patients with chronic low back pain (Feuerstein et al., 1994) and are frequently employed in the treatment of the more complex and lengthy cases. Therefore, the research hypothesis of this study was that clients from the two clinics involved in the study would differ based on their characteristics. It was expected that, compared to the clients referred to the physical therapy clinic, the clients referred to the multidisciplinary clinic would have a longer history of pain and associated disability (time off work), and would have a poorer return to work outcome following rehabilitation.

Significance of the Study

Although the research to date has indicated that many characteristics of persons with low back pain are correlated with prolonged disability, some gaps in the knowledge remain. The relationship between client characteristics and the type of rehabilitation clinic to which clients are referred has not been examined. It is not known whether the characteristics that predict physical therapy referral are the same as those that predict multidisciplinary clinic referral. Also, it is not known whether the characteristics of persons with chronic low back pain influence the length of rehabilitation received. The present study examined these relationships, and provides new information of how client characteristics influence rehabilitation, length of treatment, and return to work following rehabilitation.

To date, studies that have examined return to work status have often measured return to work outcome as a dichotomous variable. The current study included 5 categories of outcome during data collection in an attempt to capture the various levels of outcome following rehabilitation. The 5 categories of outcome were collapsed into 3 for the analysis. The outcomes following rehabilitation provide information about the destination of clients with chronic low back pain following rehabilitation.

Finally, much of the work to date has been performed in the United States and Scandinavia on subjects supported by the Worker's Compensation Board (WCB) or an employer-funded rehabilitation program. The current study includes subjects whose rehabilitation is funded by the public healthcare system in addition to those who are supported by employers, WCB, and insurance plans. The study provides new information regarding the influence that the source of funding has on the rehabilitation clinic attended, on the length of treatment received, and on return to work status following rehabilitation.

Operational Definitions

Multidisciplinary Clinic: A rehabilitation clinic that employs a variety of disciplines who work together in a team approach. For the purposes of the current study, a multidisciplinary clinic is composed of a team that consists of a physician, a psychologist, an occupational therapist, a physical therapist, an exercise therapist, and a nurse. Other services include a dietitian and vocational counselors. The clinic operates on a physician-referral basis.

Physical Therapy Clinic: A private physical therapy clinic that operates on a physician-referral basis. Treatment is provided by physical therapists.

Low Back Pain: Low back pain is defined as pain that is localized to the lumbar spine region. It may or may not be accompanied by associated symptoms such as: sciatica, radiating pain, and other neurological signs and symptoms.

Chronic Low Back Pain: Low back pain in excess of 6 months.

Disability: The World Health Organization (1980) definition of disability is "any restriction or lack of ability to perform an activity in the manner or within the range considered normal by reason of any medically determinable physical or mental condition."

Delimitations

This study was delimited to:

1. Male and female subjects between the ages of 16 and 65 years.
2. Subjects suffering from low back pain for longer than 6 months with no specific diagnosis.
3. Subjects from the greater Edmonton area who were referred to one of the two rehabilitation clinics involved in the study.
4. Subjects who were employed prior to the onset of low back pain.

Limitations

This study was limited by:

1. The accuracy of the information contained in the client files from the two clinics involved in the study.
2. The variability of the treatment provided to the clients, both between the two clinics, and between the subjects.
3. The client characteristics collected. Other factors are known to contribute to chronic low back pain disability, however the present study is limited to the characteristics mentioned in the following sections.

CHAPTER TWO

REVIEW OF THE LITERATURE

Introduction

A review of the literature was conducted on the existing research on chronic low back pain rehabilitation and return to work. This chapter begins with a discussion of the incidence of low back pain and some of the characteristics that are known to influence prolonged disability in persons with this condition. The referral to rehabilitation for persons with chronic low back pain is also discussed.

The Incidence of Low Back Pain

Low back pain is a relatively common condition in the industrialized world. It is believed that neither the incidence nor prevalence of low back pain has changed appreciably over the years, however the costs associated with low back pain and its associated disability have risen exponentially during the past two decades (Frymoyer & Cats-Baril, 1991). Since there is no reason to believe that mankind suffers from more back pain now than ever before, there is no definitive explanation for the increase in low back disability. Furthermore, coinciding with the recent increases in disability, have been some of the greatest advances in industry. The mechanization of repetitive jobs, the recognition of job-related risks for low back injury, and the recognition of the role of prevention and ergonomic modifications to job sites have occurred in the recent past. In spite of these developments, the rate of low back pain disability is continuing to rise.

The costs associated with the management of low back pain and associated disability are staggering. Frymoyer & Cats-Baril (1991) suggest that studies that have examined the costs associated with low back pain in the United States underestimate the total cost of the condition. They suggest that costs associated with hospitals, diagnostic procedures, physicians, surgery, rehabilitation, pharmaceuticals, lost productivity in the workplace, compensation, and lost tax revenue (compensation benefits are not taxed in

the USA or Canada) inflate the total cost of low back pain into the $75-100 billion range per year.

Many authors have attempted to explain this trend. The general opinion in the literature appears to be that it is not the incidence or prevalence of back pain that has changed, but rather the opinions of society with respect to back pain. While back pain was once accepted almost as an inevitability, and affected most people at one time or another, it is now regarded as a medical condition that has a precipitating event, and a condition that is deserving of compensation. In a review of the situation in Sweden, Nachemson (1994) suggested that the influence of compensation and financial gain on prolonged disability cannot be ignored. Sweden has long been recognized as having one of the most generous compensation systems in the world. Until 1992, workers on sick leave in Sweden received 100% or more of their salaries. Recently, these benefits have been reduced with those on sick leave receiving 85% of their salaries. The effect of this reduction in benefits on the number of workers on sick leave has not been investigated yet. At 85% of salary, Sweden's compensation rate is still more generous than that received in most other developed countries including the United States, Canada, Great Britain, Germany, and the Netherlands, whose compensation rates range from 40-80% (Fordyce, 1995). In 1970, 1% of the working population of Sweden was off work due to low back pain for an average of 20 days per year. In 1987 this had increased to 8% of the working population off work for an average of 34 days per year. During this time, there was a 6000% increase in the number of persons receiving permanent disability pensions for low back pain, an amount corresponding to 5% of the country's gross national product. The rates of low back pain disability have increased similarly in other developed countries, including the USA and Canada.

The general consensus in the literature is that long term low back disability is not a problem that is strictly physical in nature. The condition is affected by many demographic, socioeconomic, and psychological factors (Fordyce, 1995). Some of the factors involved in prolonged low back pain disability are discussed in the following sections.

Predictors of Low Back Pain Disability

A review of the literature on low back pain revealed at least 100 variables that have been correlated with prolonged disability (Cats-Baril & Frymoyer, 1991). Frymoyer & Cats-Baril (1987) developed a model to predict low back pain disability from various factors. Characteristics of clients with low back pain disability were collected prior to the client entering a rehabilitation clinic. Follow up evaluations were performed at six months and one year to determine disability status. Analysis of the data resulted in the most predictive variables composing an equation with variable weights determined by a panel of experts and a multivariate statistical model. The factors listed by Frymoyer & Cats-Baril (1987) as most predictive were divided conceptually into 6 groups: 1) Injury (patient's perception of fault, patient's perception of compensatability, and lawyer involvement), 2) Self-Efficacy (patient's prediction of continued disability), 3) Demographics (household income, and patient's education), 4) Pain History (whether the patient has been back at work while suffering pain), 5) Duration of pain, and 6) Job (job satisfaction, employer's attitude towards limited duty, and physical job requirements). Perhaps the most surprising revelation was the lack of physical measures as predictors.

Other investigators have recognized the importance of non-physical factors when predicting chronic low back pain disability. Frymoyer (1992) included both physical and psychological factors in a compilation of factors predictive of disability. The factors were grouped into two categories: organic and non-organic. Organic factors included (not in order of priority): diagnosis, sciatica, acute treatment, surgery, muscle strength and endurance, aerobic capacity, age, and gender. Non-organic factors included: psychological profile, illness behavior, work environment, compensation and perception of injury, attorney involvement, duration of disability, education, and income.

Lancourt and Kettelhut (1992) examined factors that predict return to work in persons with low back pain. They found that demographic variables, including smoking, level of education, prior surgery, and prior Worker's Compensation claims

were negatively correlated with return to work, and were predictive of extended disability.

Many different variables have been measured in order to determine the role they play in the outcome of clients with chronic low back pain. The list of factors is very comprehensive and it is not practical to include all the factors associated with extended disability in a study. Therefore, some of the factors that are known to be correlated with lengthy disability as well as some that are of interest were included in this study. The factors included in the current study are described in the following sections:

Age and Gender

Generally, there is an indication that the rate of low back pain increases with age. Walsh et al. (1992) conducted a postal survey of 1172 males and 1495 females between the ages of 20 to 59 and found that back pain prevalence increases with age. In men, there appears to be a general trend of increasing prevalence of low back pain with increasing age while in women, prevalence peaks between the ages of 40-49 and then diminishes. A tendency was noted for males to be off work longer than females in younger (20-39) years and older years (50-59), but not in the 40-49 age group. Subject names were obtained from 136 general practitioners in England, and therefore included people who had already sought medical advice for their back pain.

Similar results were found by Mayer et al. (1991) who reported a higher prevalence of back pain in men over the age of 65, followed closely by men between the ages of 25-35 with a slight decline during the middle years. They found that prevalence in women peaked from 35-45 years and diminished in subsequent years. Furthermore, these investigators reported that the incidence of low back pain in men peaked between the ages of 15-24, and in women, between the ages of 20-24. More men were involved in compensable low back injuries than women. However, there was not a higher percentage of men that progressed to chronicity.

Generally, there is an indication in the literature that the prevalence of low back pain increases with age. However, the predictive value of age and gender for disability

continues to be unclear and general opinion appears to be that there is no unequivocal influence of age on disability. The influence of age and gender in combination with other predictive factors, however, may result in a stronger relationship with prolonged disability.

Education

A negative correlation between education and disability has generally been reported in the literature. In a retrospective study of 200 clients receiving Worker's Compensation, Lancourt & Kettelhut (1992) found that those who had less than 12 years of education were significantly less likely to return to work than those who had more than 12 years of education.

Frymoyer & Cats-Baril (1987) indicated that work absenteeism and disability due to low back pain was inversely related to education. The investigators explained that this relationship is likely due to the fact that education is closely related to physical job demands. Well educated persons are less likely to have physically demanding occupations. As a result, there is less risk of low back injury occurring in the workplace, and low back pain may be less debilitating for them.

The relationship between education and low back pain disability, therefore, is more likely explained by the relationship between education and occupation.

Litigation and Compensation

The relationship between compensation and low back pain disability has been extensively reported in the literature. Generally, it is believed that the potential for compensation has an adverse effect on recovery from low back injury. This relationship was described by Sander & Meyers (1986) who studied 126 cases of low back injuries among railroad workers. The worker's injuries were classed as either occurring while on duty or while off duty. They found a statistically significant increase in work absence for those workers who identified that their injury occurred while on duty

compared to the off duty group. One well-accepted explanation for this is that the compensation system, as it exists, requires a worker to identify a specific event in order for compensation for a work related injury to be accepted even though the majority of low back injuries are gradual in their onset. Similarly, the legal system requires the identification of an acute incident in order for the condition to be considered compensable in the medical-legal system.

Sanderson et al. (1995) investigated a group of 269 subjects with low back pain of whom 71 were claiming medical-legal compensation for their injury. Of these 71 subjects, 19 were still employed and the other 52 were unemployed. Compared to the non-litigating subjects, the 71 subjects involved in litigation reported significantly higher disability scores. The litigating subjects demonstrated more inappropriate pain behavior and pain reporting than the non-litigants, however this relationship did not reach statistical significance. When the 71 litigating subjects were separated into those currently employed, and those who were unemployed, the authors found that the group who were unemployed reported significantly higher disability scores than those who were employed. Investigators concluded that both employment status and compensation status influence ongoing disability.

Frymoyer & Cats-Baril (1987) listed litigation as a predictive factor in the development of a model to predict low back disability. In addition, they reported that the potential for compensation is associated with decreased success following rehabilitation and that the success rate is further decreased if a lawyer becomes involved in the compensation/litigation process.

The relationship between litigation and rehabilitation outcome in clients with chronic low back pain was examined by Trief & Stein (1985). The investigators compared the outcome of treatment in two groups of clients (those with pending litigation and those who had either settled their litigation or were not litigating). Results indicated that while both groups reported beneficial effects from rehabilitation, the benefits of treatment were significantly reduced for the group involved in litigation.

Feuerstein et al. (1994) compiled a list of factors associated with prolonged work disability following multidisciplinary rehabilitation for persons with chronic low

back pain. The authors found a negative correlation between the presence of litigation and return to work.

The overall relationship between litigation and compensation with low back pain and disability is a complex one. The exact mechanism for this relationship is unclear, however the literature supports the inclusion of litigation and compensation as a predictive factor for prolonged low back disability. In addition, there appears to be an association between the presence of litigation and reduced success following rehabilitation.

Occupation

Physical job demands have been studied extensively as contributors to low back injuries in the workplace. Generally, greater physical demands correspond to an increased incidence of low back pain. A large Dutch study by Hildebrandt (1995) consisted of 8748 subjects who were employed in a variety of trades and professions. A total of 26.6% of workers reported frequent low back pain, however only 2% reported a work absence in the past 2 months due to low back pain. The prevalence of low back pain varied from 12-41% depending on the type of occupation. Persons with physically demanding occupations such as construction workers, plumbers, drivers, and custodial workers reported a higher prevalence of low back pain. These are all occupations that require intermittent periods of heavy lifting.

Strang (1992) indicated that a higher incidence of back injuries is found in people with heavy occupations compared to those in sedentary occupations. Jobs requiring heavy lifting and activities such as bending, twisting, pushing, and pulling are associated with an increased incidence of back pain. Some investigators have reported an increased risk in people who work in predominantly sitting postures while others (Svensson & Andersson, 1989) have found that time spent sitting did not play a significant role in low back disability. The latter study included only female subjects and did not indicate whether sitting positions were supported or not. Supported sitting

has been previously shown by Andersson (1974) to cause less back strain than unsupported sitting.

The literature indicates a relationship between physical job demands and an increased incidence of low back pain. Occupations that require heavy lifting, particularly in combination with bending or twisting movements are more likely to contribute to increased low back pain. In addition to the physical job demands posing a risk for back pain, the job demands may also pose as a barrier to a speedy return to work following a back injury.

Time off work

The general consensus in the literature is that the more time that is lost from work due to pain and disability, the less likely that there will be a successful return to work. There is a greater probability of permanent disability as the duration of low back pain and time away from work increases. Cats-Baril & Frymoyer (1991) found that those employees who remained at work through an acute phase, or those who returned to work before they were pain-free were unlikely to become disabled. There is support for keeping people at work in an effort to reduce prolonged low back disability. Furthermore, their research indicated that clients who have been off work for 6 months or more have only a 20% chance of ever returning to work. Other investigators have supported the inverse relationship between time off work and low back pain disability (Ehrmann-Feldman et al., 1996).

Body Composition

The relationship between body composition and low back pain has been established in the literature. A study (Makela et al., 1993) of 7217 Finns aged 30 or older found that both low (below 20 kg/m^2) and very high (35 kg/m^2 or greater) BMI values were associated with disability due to musculoskeletal disorders. Of those subjects with BMI values greater than 26.0 kg/m^2, an average of 36.5% reported a decreased working capacity. Decreased working capacity was determined by a

questionnaire which asked whether the respondents had to reduce or change work activity due to their condition. Although the study was not limited to subjects with chronic low back pain, a large number (n = 493) of these subjects were included.

Generally, increased body mass has been linked with an increased risk of back pain as well as other musculoskeletal disorders.

Rehabilitation

The role of rehabilitation in the management of low back pain is well-accepted. There is little doubt that treatment and rehabilitation efforts are critical to the outcome of clients with chronic low back pain. There is strong support for conservative (non-surgical) treatment of non-specific, uncomplicated low back pain. An active rehabilitation approach, utilizing a sports medicine model is being increasingly followed by practitioners (Feuerstein, 1991). This treatment approach aims for early mobilization and return to work with a focus on physical conditioning programs for appropriate clients.

In certain circumstances, surgical intervention is indicated in the treatment of low back pain. Most researchers agree that persons who present with progressive neurological involvement due to disc herniation, or persons with the relatively rare cauda equina syndrome require prompt surgical care (Mooney, 1991). However, the great majority of low back pain patients should improve without the need for surgical intervention. The support for conservative treatment is due in part to disappointing results following surgical treatment in many cases. One of the most well-known control studies (Weber, 1983) involved patients presenting with typical herniated disc syndrome. Subjects were alternately placed into a group of conservative care that utilized 2 weeks of progressive mobilization, or a group who received surgical disc excision. At one year follow-up, the disc surgery was determined to be successful in relieving the symptoms in the majority of the subjects who received the treatment. At four year follow-up, the results were only slightly better than the non-operated group, and at ten years, there were no significant differences between the pain complaints of

the patients in both groups. Interestingly, the decision for surgery appears to be partly geographic in nature. More surgery is performed per capita for lumbar spine problems in the USA than in any other country (Mooney, 1991). Generally, the literature indicates that surgery may be helpful in appropriate patients, however, the majority recover without any surgical intervention.

Increasingly, a multidisciplinary rehabilitation approach is being used to treat clients with chronic low back pain, the rationale being that a variety of disciplines are better able to deal with the multi-dimensional nature of chronic pain. The College of Physicians and Surgeons of Alberta (CPSA, 1993) published a position statement outlining guidelines for the management of chronic non-malignant pain. The position adopted by the CPSA advocates a multidisciplinary approach for the management of chronic pain and encourages physicians to manage these clients in a way that encourages the development of coping skills and improved function.

Physical therapy, acting either as a single discipline, or operating within a multidisciplinary team approach, aims to improve physical function and prevent client deconditioning with a goal to returning the client to a productive lifestyle. Due to the multi-factorial nature of chronic pain, there is a strong trend towards the multidisciplinary management of these clients. Williams et al. (1993), Deardorff et al. (1991), and Jensen et al. (1994) have found improvements in self-reported function and coping following a multidisciplinary rehabilitation program for subjects with chronic pain. Turner & Clancy (1986) and Deardorff et al. (1991) found a decrease in self-reported pain following multidisciplinary treatment of subjects with chronic pain. However, no long-term follow up was completed to determine whether the effects of treatment persisted.

The increasing support for multidisciplinary approaches to the treatment of persons with chronic low back pain comes as a result of the recognition of the multi-factorial nature of chronic pain conditions. The characteristics of persons who are referred for multidisciplinary rehabilitation treatment have not been examined. However the general opinion in the literature is that multidisciplinary settings are the treatment of choice for the more difficult clients who suffer from lengthy disability as a

result of their low back pain (Feuerstein, 1991). Whether multidisciplinary rehabilitation clinics are more successful than single discipline clinics in treating clients with chronic low back pain is not known.

Psychological Considerations in Low Back Pain Disability

Psychological measures used in chronic pain research are extensive. There appear to be two theories for the chronic pain psychological profile. The first is that, in the early course of the episode, there is no difference between a client who will become disabled and one who will not. Only as the episode progresses to the chronic state does the psychological profile of the client start to change. The second explanation is that certain psychological variables and psychological dysfunction exist prior to the onset of pain, and are predictive of disability.

The research appears to support both theories. Polatin et al. (1993) conducted a study of 200 subjects with chronic low back pain in order to assess current and lifetime psychiatric syndromes. The investigators also assessed whether the psychological conditions preceded or followed the development of chronic low back pain. A structured interview utilizing the widely accepted American Psychiatric Association DSM III criteria was conducted with each subject. The structured interview instrument allowed the investigators to determine whether psychiatric symptoms preceded or followed a life event, allowing investigators to assess the relationship between psychiatric criteria and onset of low back pain. Results indicated that 98% of clients received at least one lifetime psychiatric diagnosis and 81% met criteria for two disorders. When the obvious category "somatoform pain disorder" (a pre-occupation with pain for at least six months) was removed from the analysis, 77% of clients still met lifetime diagnostic criteria for psychiatric disorders. The most frequent disorders were major depression, substance abuse, and anxiety disorders. Current (at the time of the study) psychiatric diagnostic criteria were met in 59% of clients, excluding the somatoform pain category. The most frequent disorders were major depression, and substance abuse. In addition, 51% of clients fulfilled diagnostic criteria for various

personality disorders. This is significantly greater than current estimates for the general population. Depression was equally divided between premorbid and postmorbid onset, while substance abuse occurred primarily before low back pain onset. Anxiety disorders were also predominantly premorbid. Investigators concluded that while some psychiatric diagnoses appear to demonstrate a morbidity pattern, psychiatric factors contribute to prolonged disability, particularly if untreated.

The ability of clients to cope with their pain has been shown to play a significant role in the adaptation to pain (Rosenstiel & Keefe, 1983). Various coping strategies have been correlated with adaptive and maladaptive pain behaviors in the literature. Somatization, or pain focused behavior, has been shown to be an indicator of poor coping mechanisms.

The ability of clinicians to accurately assess pain behavior has been examined in the literature. Waddell et al. (1980) standardized a number of non-organic or behavioral signs in response to physical examination in subjects with chronic low back pain. Among the signs were: disproportionate verbalization of pain, facial expressions, muscle tension, tremors, sweating, and collapsing. The clinicians rated clients' response to physical examination as either "normal" or "over-reacting". The measurement tool developed by the investigators involved a global rating of pain behaviors, not an itemized list of individual behaviors as other researchers have done. The tool developed by Waddell et al. (1980) was found to be specific to low back pain clients, and to have good inter-rater and intra-rater reproducibility. The method used by the investigators is an easily utilized clinical tool, but is considered to be subjective and vulnerable to observer bias.

Other investigators have since added pain behaviors such as guarding, bracing, rubbing, position shifting, grimacing, moaning, and groaning to the list of overt pain behaviors (Keefe & Block, 1982). Physician's ratings of pain behavior during a standardized physical examination were assessed by Waddell & Richardson (1992). A total of 120 subjects with chronic low back pain (at least 3 months duration) were examined and a global rating of each pain behavior described by Keefe & Block (1982) was recorded by the physician following the examination. The data recorded included

only whether the behavior was demonstrated and not the number of times it was demonstrated during the examination. Investigators found that overt pain behavior was significantly correlated with other variables including: age, length of time off work, pain intensity rating, and psychological distress. The main limitation of studies of pain behavior is the complexity of the observation and recording system required. The methods tend to be too cumbersome for clinical use.

The relationship between perception of fault and response to treatment was evaluated by DeGood and Kiernan (1996). Subjects were 188 persons who attended a pain management program. Of these, 33.2% suffered from low back pain and all subjects had suffered from pain for a mean duration of 2.8 years or more. Subjects completed a questionnaire relating to their response to previous treatment. Perception of fault was divided into 3 categories: employer's fault, other's fault, or noone's fault. Perception of fault was strongly associated with poor response to past treatments (surgery, injections, and rehabilitation). Poor response to previous treatment was reported by significantly more subjects ($p = .003$) who faulted an employer (59.4%) compared to 28.2% who faulted another, and 19.8% who faulted noone. Subjects in the three fault groups did not significantly differ based on the key factors of pain intensity, location of pain, duration of pain, or activity disruption. In addition, perception of fault was significantly related to psychological distress reported by the subjects, with the subjects faulting the employer reporting significantly higher distress levels than other subjects. Investigators concluded that if one feels victimized by another's error or mistake, there is an increased degree of suffering demonstrated.

Rehabilitation Referral

The role of rehabilitation in the management of chronic low back pain is well-accepted. Rehabilitation in chronic pain conditions can take many forms and may include disciplines such as physical therapy, occupational therapy, psychology, nursing, chiropractic, and physiatry, working together as a multidisciplinary team or as individuals. In addition to the traditional rehabilitation approaches, a variety of alternative approaches to rehabilitation including acupuncture, reflexology, and

alternative therapies, are becoming increasingly popular. Physical therapy continues to be one of the most accepted rehabilitation approaches for chronic low back pain. Physical therapists, acting either as a single discipline in private outpatient clinics or as members of a rehabilitation team in a multidisciplinary setting, play an important role in the outcome of clients with chronic low back pain.

Until recently in Alberta, clients needed a physician's referral to receive physical therapy treatment either at private physical therapy clinics or at multidisciplinary rehabilitation clinics. Elam et al. (1995) surveyed 114 emergency physicians to determine whether they would refer clients with chronic low back pain for physical therapy treatment. Physicians were presented with hypothetical clinical situations involving clients with low back pain. The results indicated that 42% of the physicians would refer the clients in the questionnaire for physical therapy treatment. Because the physicians responded to three hypothetical patient presentations, however, these referral rates may not necessarily materialize in true clinical situations.

Physicians refer clients for physical therapy treatment based on a number of factors. Kerssens & Groenewegen (1990) studied the physical therapy referral patterns of 45 general practitioners in Holland. The physicians were divided into three groups according to their referral rate for physiotherapy: high, medium, and low. The investigators found that the age and gender of clients are the two most important determinants of physical therapy referral. The authors hypothesized that doctors who evaluate their client's complaints as somatic in nature are more likely to refer their clients for physical therapy treatment. In order to determine whether this was the case, a scale developed for the purpose of measuring physician's attitudes towards client complaints was used. The authors found that in the high-referring group of physicians, 60% evaluated their clients' complaints as somatic and were therefore more likely to refer the client for physical therapy. In the middle group, this percentage was 51%, and in the low-referring group of physicians 48% evaluated their clients' complaints as somatic in nature. Therefore, the authors accepted their hypothesis that high-referring physicians are more likely to evaluate their clients' complaints as somatic than physicians in the other two groups. The investigators also found that high-referring

physicians have a greater knowledge of physical therapy treatment, and have a closer working relationship with physical therapists than the physicians in the other two groups. Whether the clients from the groups of physicians differed in terms of their characteristics was not evaluated.

In an attempt to further examine the factors leading to physician's referrals for physical therapy, Ehrmann-Feldman et al. (1996) conducted a study of 2147 subjects with low back pain in Quebec. All subjects were receiving Worker's Compensation. The authors found that 18% of subjects were referred for physical therapy treatment. In addition, the authors found that physician-referral to physical therapy was related to certain client characteristics. The group of 389 subjects who received physical therapy referrals were compared to the group who did not receive referrals. Those workers referred to physical therapy tended to be older, to have a specific diagnosis, to be female, to be compensated at a slightly higher salary rate, and to be absent from work for more than 2 months. They also had an average work absence of 33.8 days before beginning physical therapy compared to 14 days' absence from work for the group that did not receive physical therapy. Investigators concluded that subjects who received physical therapy treatment were referred following lengthy work absences. It appears that, initially, subjects are not referred for physical therapy. However, if their condition becomes prolonged and results in continuous absence from work, they are more likely to receive a referral to physical therapy by their physician.

The referral of clients with chronic low back pain for rehabilitation is an important factor in their recovery. There remain many questions regarding referral decisions that are made by physicians to one type of treatment versus another as well as the time frames of referrals for rehabilitation.

The length of rehabilitation treatment for clients with chronic low back pain and the decisions regarding rehabilitation discharge criteria have not been thoroughly examined. It is not known whether there is an appropriate length of treatment beyond which little improvement is made, or furthermore, how clients with chronic low back pain are determined to be ready for discharge. The relationship between the length of treatment in a multidisciplinary rehabilitation facility and outcome following

rehabilitation was assessed by Dionne et al. (1994). Subjects were 106 clients (85.9% male) who had been off work for a minimum of 6 months following an occupational low back injury. All subjects were eligible for compensation from the Quebec Worker's Compensation Board. The length of treatment was recorded in days and was divided into three groups: 0-59 days, 60-111 days, and ≥112 days. Investigators recorded the length of treatment in calendar days and therefore weekend and holidays were included in the treatment time. Subjects were relatively evenly divided between the three groups. Sickness Impact Profile (SIP) scores and work status information was collected by mail five years following discharge from rehabilitation. Subjects from the second group reported less sickness related disability measured by the SIP scores and higher rates of return to work (82.4%) than subjects from the other two groups (61.8% and 68.4%) five years after discharge. Investigators concluded that length of stay in a rehabilitation program influences long-term functional status. It is difficult to conclude, however, that the return to work status of subjects five years following discharge from rehabilitation is due entirely to lasting effects from rehabilitation. The return to work status of the subjects immediately following discharge from rehabilitation was not included. As the investigators note, the five-year work status of the subjects may be influenced by a number of other factors. It was not stated whether the subjects were receiving continued compensation from the Worker's Compensation Board at the time of follow-up. Nonetheless, the study appears to indicate that rehabilitation beyond approximately 16 weeks duration does not result in further long-term improvement in persons with chronic low back pain.

Outcome Measures in Chronic Low Back Pain

Outcome following rehabilitation is measured in a number of ways. A review of the literature has included the following as outcome measures: reduced pain, reduced medication intake, reduced psychiatric/psychological impairment, improved posture, gait, and range of motion, patient education regarding coping strategies for pain management, increasing activities of daily living, decreasing the impact of pain on

activities, and restoring occupational roles (Fishbain et al., 1993). The vast majority of studies, however, evaluate return to work as the primary outcome measure following rehabilitation. For the clients, reduction of pain and improved coping and function is important in the management of their chronic low back pain. At the societal level, however, return to work is considered one of the most important goals following rehabilitation as this measure evaluates the extent to which a person has regained self-sufficiency and is no longer a financial burden to social support systems.

Most researchers use return to work as a dichotomous outcome, however, there is evidence that it should be broken down further. The use of return to work as an outcome measure was discussed by Fishbain et al. (1993). They indicated several methodological problems with the use of return to work as a dichotomous variable and recommended that return to work be further broken down into subcategories in order to accommodate subjects who return to light duties or alternate occupations. The investigators suggest the subcategories: returning to a job that is less physically demanding than the pre-accident job, seeking employment, and returning to work part-time.

Summary of Literature Review

A review of the literature on low back pain reveals many variables that are correlated with prolonged disability. These factors are broadly categorized into two groups: organic and non-organic. The influence of non-organic factors on the development and maintenance of chronic low back pain is well-recognized in the literature and cannot be ignored when evaluating persons with low back pain disability. Clients who possess characteristics that have been correlated with prolonged disability have been shown to have difficulty recovering to their normal level of function and specifically returning to the workplace.

The predictive value of age and gender for prolonged disability remain unclear in the literature, while some factors such as time off work and litigation are strongly

correlated with ongoing disability. Certain psychosocial variables have also shown consistently strong relationships with continued disability in the literature.

The literature indicates that, increasingly, persons with chronic pain conditions are being treated in multidisciplinary rehabilitation clinics. The characteristics that influence the type of treatment clinic to which a client is referred, however, have not been examined in the literature. Furthermore, the relationship between the type of treatment clinic attended and return to work outcome has not been examined.

The objectives of the study are to evaluate a set of client characteristics in terms of their relationship with the type of treatment clinic attended, the length of treatment received, and return to work outcome following rehabilitation.

CHAPTER THREE

METHODS

Subjects

Subjects were 124 clients who had attended one of the two rehabilitation clinics involved in the study. Data for 63 subjects who had attended a multidisciplinary clinic - Clinic 1 (Gross Rehabilitation Centre) and for 61 subjects who had attended a physical therapy clinic - Clinic 2 (Hys Centre Physical Therapy Clinic) were included. The subjects included in the study had suffered from low back pain for a minimum of 6 months duration, were between the ages of 16-65 (working age), and had been employed prior to their current episode of back pain. Low back pain was defined as pain that was localized to the low back region. It may or may not have been accompanied by associated neurological symptoms. Low back pain was the primary reason for the rehabilitation related to the study. Homemakers were excluded from the study because of the difficulty in determining return to work status according to the study criteria.

Subjects were excluded from the study if they suffered from any complicating medical or psychological illness. Exclusion criteria included the presence of: 1) active malignancy, 2) a co-existing major medical illness which may affect return to work status, 3) any organic brain syndrome or psychiatric disorder which may affect return to work status, 4) early discharge from the rehabilitation program for an undefined reason. Subjects were not excluded if they had left the rehabilitation program because they felt it was ineffective or if they felt that they had reached a level of function that they were satisfied with.

Of the 124 subjects included in the study, none were excluded from the analysis based on a psychiatric diagnosis. Since not all subjects were routinely examined by a psychiatrist, it is possible that some of the subjects included in the study had escaped diagnosis, or alternately, psychiatric diagnoses was not recorded. Based on the study results by Polatin et al. (1993) which indicated a high number of subjects with chronic

low back pain who were diagnosed with psychiatric disorders, there is reason to believe that the subjects included in the current study may include those with undiagnosed psychiatric disorders.

Subjects whose files were incomplete were not included in the study. While the number of incomplete files was not recorded, it is estimated that rejection of subjects due to incomplete files made up less than 20% of the total files reviewed.

Study Design and Data Collection

The study was a cross-sectional retrospective study based on data collected from the medical files from two rehabilitation clinics in Edmonton. Clients commencing treatment in January, 1994 and later were eligible for the study. This date was chosen because direct access to physiotherapy services was not in place at this time and clients would need to have been referred to one of the two clinics by their physicians. It was important to collect data from clients who had been referred for rehabilitation rather than those who had obtained services through direct access to physiotherapy in order to ensure that clients had arrived at the two clinics through the same referral mechanism.

The two clinics involved in the study were chosen because they were considered to be representative of the two types of clinics of interest (multidisciplinary and physical therapy). In addition, the clinics are located in the same building in Edmonton, minimizing the effect of location.

In order to ensure that the necessary data was available for collection from the files, a pilot study was undertaken in January 1996. Based on the pilot study, some modifications were made to the original proposed study design. Body Mass Index and level of education were not available from the client records at the physical therapy clinic. Therefore, these variables were collected only from the subjects at the multidisciplinary clinic and were used for descriptive purposes only.

Independent variables

The independent variables collected were the following:

1) Age - measured in years

2) Gender - coded as 1=male, 2=female.

3) Litigation status - coded as 1=ongoing litigation, 2=no litigation. Litigating subjects were those who were involved in a litigation process, including appeal processes, during their rehabilitation at either of the two clinics. The litigation process included any process where the subject was appealing to another party for a monetary settlement. This included insurance companies, WCB, or any other third party agency. Non-litigating subjects were those who were not involved in any form of litigation, relating to their condition, at the time of their rehabilitation. Those subjects who had completed the litigation process before their rehabilitation were considered non-litigants. Subjects who completed their litigation during rehabilitation were excluded from the analysis.

4) Occupation - coded as 1=sedentary, 2=light, 3=medium, 4=heavy, 5=very heavy based on the pre-injury physical job requirements. These levels were determined using the criteria developed by the Canadian Classification and Dictionary of Occupations (CCDO), 1989 (see Appendix A).

5) Length of pain - measured in months. Length of pain was the length of time that the subject had experienced low back pain resulting from the current episode. All subjects had a minimum of 6 months duration of pain at time of entry into rehabilitation according to the inclusion criteria.

6) Number of related surgeries - the number of operations that the subject had undergone as a direct result of their back pain. The surgeries were those that resulted

from the current episode of low back pain. Surgery was considered related if it had been performed in an attempt to reduce or relieve the symptoms of low back pain, including sciatica.

7) Funding - coded as 1=AHC (Alberta Health Care), 2=WCB (Worker's Compensation Board), 3=insurance (private insurance company), or 4=employer. The categories were the agencies that provided remuneration to the respective rehabilitation clinic for the treatment of the clients.

8) Education - measured as the number of completed years of formal education. Formal education included the number of elementary and high school years, as well as any post-secondary education in a technical diploma or degree program. This variable was available only from the subjects at the multidisciplinary clinic.

9) Onset/cause of current episode of pain - coded as 1= MVA (motor vehicle accident), 2=work-related injury, 3=insidious onset, and 4=other accident or injury (i.e. sports) by the event that precipitated the current episode of low back pain. Insidious onset included gradual pain onset over a period of time with no significant precipitating event. This category included degenerative conditions.

10) Previous rehabilitation - coded as 1=Yes previous rehabilitation and it was helpful, 2=Yes previous rehabilitation but it was not helpful, and 3=No previous rehabilitation. Previous rehabilitation consisted of previous physical therapy treatment for the same episode of low back pain that the clients were experiencing at the time of their rehabilitation related to this study. Only physical therapy was included because other treatments that the client may have received (i.e. chiropractic, acupuncture, massage) were not consistently recorded on the medical files. The information collected was whether the client had received previous rehabilitation and secondly, whether this rehabilitation was considered helpful in the opinion of the client.

11) Pain focused behavior - coded as 1=pain focused, 2=not pain focused. Pain focused behavior included any behaviors that would suggest poor pain management skills, including increased or exaggerated symptom reporting, and increased physical sensitivity on assessment. Pain focused behavior was determined by the clinicians involved in the assessment of the client. These included the physical therapist, occupational therapist, exercise therapist, psychologist, and nurse case coordinator at the multidisciplinary clinic, and the physical therapist at the physical therapy clinic.

12) BMI (Body Mass Index) - measured as the ratio of weight (in kilograms) divided by height squared (in meters) according to the Canadian Standardized Test of Fitness operations manual (1986). BMI is an anthropometric measure and an indication of body composition. It is an indicator of health risk based on proportional body weight, with norms for Canadians being established based on data from the Canada Fitness Survey (1981). Generally, the normal BMI range is from 20-25 kg/m^2. Values less than 20 kg/m^2 or greater than 27 kg/m^2 are associated with increased risk of health problems. This variable was available only for the clients from the multidisciplinary clinic.

13) Time off work - measured in months. Time off work was the time lost from work related to the current episode of low back pain. It included all sick time related to the event, as well as any short term or long term disability that had been taken due to the current low back pain.

14) Additional pain - coded as 1=presence of additional pain, 2=no additional pain. Additional pain included any pain in addition to low back pain. It included referred pain, sciatica, as well as pain in other locations that may not be related to low back pain.

15) Length of treatment - measured in number of calendar weeks that the client attended rehabilitation at either of the clinics for the current episode of low back pain.

Dependent Variable

The dependent variables included in the analyses were as follows:

1) The treatment clinics were identified as Clinic 1 (multidisciplinary) and Clinic 2 (physical therapy). The clinic was used as the dependent variable for the analysis of the relationship between the independent variables and the treatment clinic attended (Objective 1).
2) The length of treatment, measured in weeks, was used as the dependent variable for the analysis of the relationship between the independent variables and the length of treatment (Objective 5).
3) Return to work was used as the dependent variable for the analysis of the relationship between the independent variables and return to work following rehabilitation (Objective 3). In addition it was used as the dependent variable to assess the relationship between the rehabilitation clinic attended and return to work (Objective 2), as well as for the analysis of the relationship between the length of treatment and return to work (Objective 6). At the time of discharge from rehabilitation, return to work status was collected and divided into five groups: 1) those who returned to their pre-injury occupation performing regular duties, 2) those who returned to work performing light or modified duties, 3) those who returned to a different occupation, 4) those who began an education or vocational program, and 5) those who did not return to any type of gainful employment. For the analysis, return to work was collapsed into 3 categories described in Table 1.

Data Analysis

Descriptive statistics and frequencies were used to summarize subject characteristics. Continuous variables were summarized by means and standard deviations. Differences between clinics were determined by t-test analyses. Categorical variables were summarized by frequencies. Differences between clinics were

determined by chi square analyses. Cross-tabulations were conducted when appropriate in order to evaluate the relationships between categorical variables.

Multiple regression analyses (stepwise and forced entry) were used to analyze the relationships between the independent variables and the treatment clinic attended, the relationship between the independent variables and the length of treatment, and the relationship between the independent variables and return to work. Stepwise regression analyses were conducted in order to assess the relative influence of the independent variables on a dependent variable in order of decreasing influence. The forward-entry stepwise regression procedure was used, with an inclusion default significance level set at .05. Forced-entry regression analyses were conducted to determine the influence of a set of independent variables on the dependent variable. In the forced regression procedure, all of the independent variables were forced into the regression equation in order to determine their relative influence on the dependent variable. The raw score regression weights were examined to evaluate the relative influence of each independent variable on the dependent variable when all other independent variables are held constant. Statistical procedures were performed using the statistics program SPSS, version 6.1.3.

For the purposes of conducting the regression analyses, the categorical variables were transformed to a set of dichotomous variables. This was accomplished by creating a series of columns (one less than the number of choices). Each column was transformed to a dichotomous variable corresponding to each choice within the variable. The column representing the appropriate choice was assigned the value 1 and since only one choice was possible within each categorical variable, the other columns were assigned the value 0. The following variables were treated this way: funding, cause of current pain, and previous rehabilitation.

For each analysis, Pearson correlation procedures were conducted to analyze the relationship between a single independent variable and the dependent variable. Pearson correlation coefficients were used to assess the relationship between the clinic attended and the length of treatment, the relationship between the length of treatment and return to work, and the relationship between the clinic attended and return to work (see Figure

1). Pearson correlations were also conducted to assess the relationships between the independent variables.

A factor analysis was conducted in order to determine whether the independent variables included in the regression analyses may be explained by a smaller number of factors. LISREL analyses were conducted following the factor analysis in order to evaluate the fit of the model used in the study.

All results were analyzed using a .05 level of significance except where otherwise indicated.

Ethical Considerations

The primary investigator received consent from both clinics involved in the study prior to accessing the information contained in the medical files. Letters of support from the clinics are included in Appendix B. Client names were not recorded. Subjects were assigned a number that was available only to the primary investigator. Client confidentiality was maintained throughout. No client information, other than that which was required for the study, was recorded. Prior to the onset of data collection, this study was approved by the Student Project Ethics and Research Review Committee (SPERRC) of the Department of Physical Therapy, University of Alberta.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

The results and discussion sections are presented together for each relationship described in the objectives section. The results of the regression analyses for each of the relationships in Figure 1 are described in turn. Pearson correlations are presented, followed by the stepwise regression procedure results, and the forced regression results for each relationship. Pearson r correlation values of greater than -.20 to .20 are considered significant for the purposes of interpreting the results of the correlation procedures and regression analyses. Due to the large sample size, this level was chosen in order to minimize the chances of making a Type I error.

Return to Work Variable

The outcome variable, return to work, was collected for 5 possible levels: return to previous occupation, return to other occupation, return to modified/light duties, return to education/vocational training, or no return to work. For the purposes of the analysis, the 5 levels of outcome were combined using 3 different methods in order to achieve relatively similar numbers of subjects in each category (Table 1). Conceptually, the methods of combining return to work outcome may have been better achieved by combining those subjects who went on to education or vocational retraining with those who did not return to work. The rationale for this being that those subjects who participated in education/vocational retraining did not not return to a work environment, and would have lost the attachment to a job. In the present study, the decision to combine the outcome variable in the manner chosen was partially made to accommodate for the low numbers in three of the categories.

The number of subjects in each return to work category are shown in Table 11. The three methods of combining the outcome variable produced similar results with respect to their relationships with the clinic attended, the length of treatment, and to the independent variables. Therefore, only the results of the first method will be presented.

Table 1: Three methods of combining the dependent variables.

Method 1	Method 2	Method 3
3 = return to previous occupation	3 = return to previous occupation = return to other occupation	2 = return to previous occupation = return to other occupation = modified/light duties = education/vocational training
2 = return to other occupation = modified/light duties = education/vocational training	2 = modified/light duties = education/vocational training	1 = no return to work
1 = no return to work	1 = no return to work	

Subject Characteristics

The characteristics of the subjects are shown in Table 2 (continuous variables) and Table 3 (categorical variables). The subjects from the two clinics differed significantly with respect to age and time off work. T-test analysis revealed a significant difference between the ages of the subjects from the two clinics, however the difference was less than 4 years and, practically, was not considered significant.

Compared to other studies on low back pain, the subjects in the current study appear to be relatively similar in age. Ehrmann-Feldman et al. (1996) described 389 subjects with low back pain who were referred for physical therapy treatment. The mean age of their subjects was 36.4 years. The gender of their subjects was different than the present study, with males making up 71.5% of those receiving physical therapy. The likely reason for this difference was that all their subjects were from Worker's Compensation Board data, and typically a larger number of males make up this population. The majority of the subjects from both clinics in the current study were AHC funded.

Jette et al. (1994) reported a mean age of 43.4 years in a group of subjects who received physical therapy treatment for low back pain. Of a total of 2328 subjects, 895 had received treatment at private physical therapy clinics. Of these, 46.1% were female and 53.9% were male. The subjects included in the study were not limited to those who were suffering from chronic low back pain, although 24.7% of the subjects had suffered from low back pain for longer than 7 months prior to their physical therapy treatment.

Table 2: Means, standard deviations, and ranges of continuous variables for subjects from Clinics 1 and 2.

	Clinic 1 (Multidisciplinary) (n=63) 50.81%	Clinic 2 (Physical Therapy) (n=61) 49.19%	T-value	Sig.
Age (years)				
Mean	40.25	36.52	2.41	.017
SD	8.16	8.98		
Range	24-59	22-57		
Length of Pain (months)				
Mean	34.14	28.46	1.11	.271
SD	26.15	30.94		
Range	6-132	6-156		
Time off Work (months)				
Mean	14.87	5.48	3.99	.000
SD	15.75	9.91		
Range	0-72	0-38		
Length of Treatment (weeks)				
Mean	8.60	9.11	-.68	.500
SD	3.63	4.68		
Range	3-21	3-20		
Body Mass Index (kg/m^2)				
Mean	28.27	N/A	N/A	N/A
SD	6.38			
Range	18.70-50.60			
Education (years)				
Mean	11.47	N/A	N/A	N/A
SD	2.36			
Range	5-16			
Return to Work				
Mean	1.59	2.36	N/A	N/A
SD	.75	.84		
Range	1-3	1-3		

Table 3: Frequencies and percent ( ) of categorical variables describing subjects from Clinics 1 and 2. Chi-square significance values are included.

	Clinic 1 (Multidisciplinary) n=63 (50.81)	Clinic 2 (Physical Therapy) n=61 (49.19)	Total n=124 (100)	Sig.
Additional Pain				
Present	57 (90.5)	47 (77.0)	104 (83.9)	.327
Absent	6 (9.5)	14 (23.0)	20 (16.1)	.074
Cause of Pain				
MVA	32 (50.8)	20 (32.8)	52 (41.9)	.096
Work	17 (27.0)	24 (39.3)	41 (33.1)	.274
Insidious	9 (14.3)	14 (23.0)	23 (18.5)	.297
Other	5 (7.9)	3 (4.9)	8 (6.5)	.480
Funding				
AHC	44 (69.8)	36 (59.0)	80 (64.5)	.371
WCB	7 (11.1)	16 (26.2)	23 (18.5)	.061
Insurance	5 (7.9)	9 (14.8)	14 (11.3)	.285
Employer	7 (11.1)	0 (0.0)	7 (5.6)	
Gender				
Male	32 (50.8)	32 (52.5)	64 (51.6)	1.00
Female	31 (49.2)	29 (47.5)	60 (48.4)	.796
Litigation				
Yes	38 (60.3)	28 (45.9)	66 (53.2)	.218
No	25 (39.7)	33 (54.1)	58 (46.8)	.294
Occupation				
Sedentary	8 (12.7)	16 (26.2)	24 (19.4)	.103
Light	14 (22.2)	10 (16.4)	24 (19.4)	.414
Medium	33 (52.4)	25 (41.0)	58 (46.8)	.294
Heavy	6 (9.5)	8 (13.1)	14 (11.3)	.593
Very Heavy	2 (3.2)	2 (3.3)	4 (3.2)	
Pain Focused				
Yes	37 (58.7)	27 (44.3)	64 (51.6)	.211
No	26 (41.3)	34 (55.7)	60 (48.4)	.302
Previous Rehabilitation				
Helpful	21 (33.3)	19 (31.1)	40 (32.3)	.752
No Help	40 (63.5)	25 (41.0)	65 (52.4)	.063
No rehab	2 (3.2)	17 (27.9)	19 (15.3)	.001
Surgery				
None	53 (84.1)	54 (88.5)	107 (86.3)	.923
1	7 (11.1)	5 (8.2)	12 (9.7)	.564
2	2 (3.2)	2 (3.3)	4 (3.2)	
3	1 (1.6)	0 (0.0)	1 (0.8)	

No significant differences were found between the subjects from the two clinics with respect to the length of treatment they received or the length of time that they had suffered from low back pain. The values for both time off work and surgery variables for subjects from both clinics were clustered towards the low end of the scale of values. This would have the effect of skewing the variables and would have affected the subsequent correlation procedures.

With respect to the categorical variables, chi square analysis revealed only one variable that significantly differed between the two clinics: previous rehabilitation. There were more subjects at the physical therapy clinic who had not received previous rehabilitation.

The average length of time that subjects from the multidisciplinary clinic were off work was 14.9 months compared to 5.5 months for subjects from the physical therapy clinic. The general consensus in the literature indicates that time off work is a significant factor in the prediction of return to work in persons with low back pain (Cats-Baril & Frymoyer, 1991). The results of the present study would then tend to support the view that multidisciplinary clinics generally treat more difficult and chronic cases as well as clients for whom other attempts at rehabilitation have not been successful.

Body Mass Index (BMI) values were collected from the subjects from the multidisciplinary clinic. The mean BMI value was 28.3 kg/m^2. The range of BMI values considered acceptable in terms of health status is from 20-27 kg/m^2. This indicates that on average, the subjects are outside of the normal range and in the region associated with increased risk for developing health problems (CSTF operations manual, 1986). Generally, increased body mass has been linked with an increased risk of back pain as well as other musculoskeletal disorders in the literature. The results of this study appear to support the Finnish study by Makela et al. (1993) who found that both low (below 20 kg/m^2) and very high (35 kg/m^2 or greater) BMI values were associated with disability due to musculoskeletal disorders. Although their study was

not limited to subjects with chronic low back pain, 493 subjects with chronic low back pain were included.

A proportionately larger number of subjects from the multidisciplinary clinic (90.5%) reported additional pain (pain in addition to low back pain) at the time of their initial assessment than clients from the physical therapy clinic (77.0%). However, the majority of subjects from both clinics reported additional pain. Because additional pain included pain in other locations as well as radiating pain or referred pain, this variable did not distinguish between subjects with symptoms related to their low back pain and those who were suffering from other musculoskeletal problems.

The cause of low back pain varied by clinic. The majority of subjects from the multidisciplinary clinic reported a motor vehicle accident as the event that precipitated their low back pain (50.8%) compared to 32.8% of clients from the physical therapy clinic. Of the clients who attended the multidisciplinary clinic, 60.3% were involved in litigation proceedings compared to 45.9% of subjects from the physical therapy clinic. In order to evaluate the relationship between cause of pain onset and litigation for subjects from both clinics, a crosstabs procedure was conducted (Table 4).

Table 4: The relationship between cause of back pain and litigation for subjects from both clinics.

	Cause of Back Pain			
Litigation Status	MVA	Work	Insidious (Gradual)	Other
Litigating	48 (72.7%)	15 (22.7%)	3 (4.5%)	0
Not Litigating	4 (6.9%)	26 (44.8%)	20 (34.5%)	8 (13.8%)

Of the 52 persons reporting a motor vehicle accident as the event that resulted in low back pain, 92.3% were involved in litigation procedures resulting from the event. This is rather a disturbing trend and it is not known whether the same volume of litigants are present at other clinics.

Alberta Health Care was the primary funding source for subjects from both clinics (69.8% and 59.0% for Clinic 1 and Clinic 2 respectively). There were more subjects funded by WCB at the physical therapy clinic (26.2%) than the multidisciplinary clinic (11.1%), and there were more subjects funded by insurance plans at the physical therapy clinic (14.8%) than the multidisciplinary clinic (7.9%). There were no employer-funded clients who attended the physical therapy clinic. It was unclear why this was the case, however the differences in funding sources likely reflect the marketing done by the two clinics.

An American study by Jette et al. (1994) reported that, of 895 subjects who received physical therapy treatment for low back pain in private physical therapy clinics, 39.8% were funded by private insurance carriers, 33.9% were funded by WCB, and 1.2% were funded by Medicaid. Demographically, their subjects appear similar to those in the current study based on age and gender, and the differences in funding likely reflect the differences in the health care systems of the two countries.

The majority of clients from both clinics had received previous physical therapy treatment for their low back pain, and of these, most reported that it was not helpful. It was not determined why the clients felt this way about their rehabilitation. It may be that the clients' expectation from rehabilitation is pain relief and when this is not delivered, they conclude that treatment has not been helpful. If this is the case, it would be very important for clinicians to discuss the goals of rehabilitation with the client and educate them about their pain condition. In any case, it is recognized that clients who feel that they have not been helped are more likely to pursue further treatment.

Only 3.2% of the subjects who attended the multidisciplinary clinic had not received previous rehabilitation. This supports the general opinion that multidisciplinary clinics tend to be a treatment of last resort, undertaken after previous attempts at rehabilitation have not been successful.

The prevalence of occupations in terms of physical job demands shows the same general trend for both clinics with the exception of sedentary and light occupations. At the physical therapy clinic, there were relatively more subjects with sedentary occupations (26.2%) than at the multidisciplinary clinic (12.7%). The largest proportion

of subjects from both clinics were in the medium category with respect to physical job demands. The literature indicates a general trend that increasing physical job demands correspond to higher incidences of low back pain (Strang, 1992). The presence of subjects with heavy and very heavy occupations was relatively smaller than the number of subjects with medium job demands in the current study. The reason for this pattern is not clear. It may be that there are actually fewer heavy and very heavy occupations than medium occupations existing in the workplace. Many companies have recognized that increased physical job demands result in higher incidences of injury in the workplace, and increased difficulty in returning to the same occupation following injury. They have, therefore, taken measures to protect their employees from excessive physical demands. Many have installed labor saving devices such as mechanical lifts in order to minimize the physical demands on their employees. Although medium level occupations are less physically demanding than heavy or very heavy occupations, medium level jobs may demand lifting of up to 50 lb on an occasional basis (Appendix A).

The level of education attained was only available for the subjects from the multidisciplinary clinic. In order to assess the relationship between education and occupation, a cross-tabs procedure was conducted (Table 5). The general trend showed that as the years of education increased, the physical job demands decreased. This supports the findings of previous authors (Frymoyer & Cats-Baril, 1987).

The majority of subjects from both clinics had not received surgery for their back pain or related symptoms. In fact, only 15.9% of subjects from the multidisciplinary clinic and 11.5% of subjects from the physical therapy clinic had received related surgery. This would have the effect of skewing the variable and would have affected the subsequent correlation procedures.

The current study included subjects with various diagnoses of low back pain etiology. While this may pose as a limitation, it was felt that the inclusion of all diagnoses would make the results more generalizable to the clinical situation. However, it should be noted that the relationships reported in the present study may not be the same for all types of back pain diagnoses (i.e. sciatica).

Table 5: The relationship between the level of education attained and physical job demands for subjects from the multidisciplinary clinic.

Years of Education	Physical Job Demands				
	Sedentary	Light	Medium	Heavy	Very Heavy
5	0	0	1	0	0
7	0	0	3	0	0
8	0	2	0	1	0
9	0	1	1	2	0
10	0	0	4	0	1
11	0	1	3	0	0
12	3	4	13	1	1
13	1	0	1	0	0
14	2	2	2	0	0
15	1	1	1	0	0
16	1	1	0	0	0

The relationship between the independent variables and the clinic attended

Further to the results of the t-tests (Table 2), Pearson correlations indicated three independent variables that were significantly correlated with the clinic attended (see Appendix C). These factors were: 1) whether the client had received previous rehabilitation ($r = -.34$), 2) the number of months the client had been off work ($r = -.34$), and 3) age ($r = -.21$).

A stepwise regression analysis (Table 6) also revealed that previous rehabilitation and time off work were significantly related to treatment clinic attended. Age was not included in the stepwise procedure, likely because of the relatively strong correlation between age and time off work ($r=.34$) (Appendix H).

Table 6: Results of stepwise regression analysis to predict treatment clinic attended from independent variables.

Step	Independent Variable	Multiple R	R^2	Sig.
1	Previous Rehabilitation	.343	.117	.0001
2	Time off Work	.437	.191	.0000

The results of the stepwise regression and the t-tests previously described in Table 2 indicate that clients from the multidisciplinary clinic were more likely to have had previous rehabilitation and were off work longer. This appears to indicate that physicians refer the 'more difficult' cases to the multidisciplinary clinic. The fact that persons who attended the multidisciplinary clinic had received previous physical therapy treatment more often and had been off work for a longer period of time, appears to support the general opinion that multidisciplinary clinics are a treatment of last resort. undertaken after other forms of rehabilitation have not been successful. The results of previous treatment may influence the decisions of referring physicians in terms of further treatment attempts. Furthermore, the level of pain-related disability and the impact of the client's condition on their function (i.e. work absence) appears to influence the treatment decisions made by referring physicians.

Ehrmann-Feldman et al. (1996) found that physician-referral to physical therapy was related to certain client characteristics. Their study indicated that an absence from work of 2 months or longer was strongly related to physical therapy referral. The subjects in the present study had been off work for a mean length of time of 14.9 months and 5.5 months for the multidisciplinary clinic and the physical therapy clinic subjects respectively. This appears to support the findings of Ehrmann-Feldman et al. Subjects in the current study appear to have been referred for rehabilitation following lengthy work absences. However, many had undergone previous rehabilitation attempts so that the length of time off work may seem rather lengthy in comparison to the results from the Ehrmann-Feldman study.

A forced-entry regression analysis revealed an additional variable: source of funding, that was predictive of the clinic attended (Table 7). There were no employer-funded clients who attended the physical therapy clinic. The remaining three funding sources were represented at each clinic. However, there were proportionately more clients who were funded by insurance companies and the WCB at the physical therapy clinic than at the multidisciplinary clinic (Table 3). The differences in the number of clients who were funded by the four agencies included in the study were probably due in part to the marketing and promotion done by the two clinics. In addition, the differences in the cost of treatment at the two facilities may have influenced the number of clients funded by the four agencies. The cost of treatment at the multidisciplinary clinic was significantly greater than the cost at the physical therapy clinic.

Table 7: Significance of independent variables and raw score regression weights from the forced regression analysis to predict treatment clinic attended.

VARIABLE	Sig.	Weight
Funding - Insurance	.0021	.700
Previous Rehabilitation	.0025	-.449
Funding - AHC	.0039	.551
Funding - WCB	.0062	.564
Time off work	.0449	-.008
Cause - Work	.1065	.340
Age	.1471	-.007
Occupation	.2744	-.054
Cause - Insidious	.3985	.165
Additional Pain	.4035	.110
Length of Pain	.5282	.001
Previous Rehab Helpful	.5603	.059
Gender	.6145	-.051
Cause - MVA	.6389	.101
Pain Focus	.6530	-.047
Surgery	.7375	-.031
Litigation	.8162	.030

The relationship between the independent variables and the length of treatment

Two independent variables were significantly correlated with the length of treatment the clients received at the two clinics (see Appendix D). The factors were: 1) whether the client demonstrated pain focused behavior ($r = -.27$), and 2) the source of funding for rehabilitation ($r = .26$).

Both the stepwise regression and the forced-entry regression analysis revealed the same two independent variables as predictors of length of treatment (Table 8 and 9).

Table 8: Results of a stepwise regression analysis to predict treatment clinic attended from the independent variables.

Step	Independent Variable	Multiple R	R^2	Sig.
1	Pain focused behavior	.273	.075	.0022
2	Funding	.351	.124	.0003

When the raw score regression weights from the forced-entry regression analysis were examined, length of treatment was 1.9 weeks less for subjects who were not pain-focused than for those who were pain-focused when all other variables were held constant (Table 9). Whether clinicians feel that a client is coping with their pain appears to have an impact on the length of treatment those clients receive and subsequently the cost of their rehabilitation. This has relevance for funding agencies who pay for rehabilitation services since the cost is proportional to the length of time spent in rehabilitation. The relationship between pain-focused behavior and the length of treatment may be influenced by other factors, including the attitudes of the therapists. Therapists may have pre-conceived opinions that clients who are pain-focused will require longer rehabilitation time.

Table 9: Significance of independent variables and raw score regression weights from the forced regression analysis used to predict length of treatment.

VARIABLE	Sig.	Weight
Funding - Insurance	.0143	5.06
Pain focused behavior	.0388	-1.93
Funding - WCB	.1276	2.86
Previous Rehabilitation	.1282	2.06
Surgery	.1375	1.22
Funding - AHC	.1759	2.36
Occupation	.3374	.428
Gender	.4661	.659
Time off Work	.4883	-.024
Length of Pain	.4976	-.010
Cause - Work	.5703	-1.08
Previous Rehab Helpful	.6063	-.466
Cause - Insidious	.6405	-.820
Additional Pain	.6538	.530
Litigation	.7089	.429
Age	.7726	-.013

Raw score regression weights from the forced-entry regression analysis were examined to determine the influence of the source of funding on the length of treatment received (Table 9). When a client was funded by a private insurance plan, the length of treatment was 5 weeks longer than for those not covered by private insurance when all other variables were held constant. The reason for this was not clear, however one explanation may be that an insurance company places a high emphasis on returning to work and thus the rehabilitation clinics may take extra time to ensure a successful return to work. In spite of the extra time spent in rehabilitation, however, a crosstabs

procedure revealed that proportionately only 28.6% of all clients funded by insurance plans returned to their previous occupation and 42.9% did not return to any gainful employment (see Table 10). It should be noted that in the current study, there were only 14 subjects funded by insurance plans and 7 who were funded by their employers. The limitations of this data make it difficult to speculate extensively about the results found.

Table 10: Return to work outcome by source of funding for subjects from both clinics.

Source of Funding	No return to work	Return to: -modified/light duties -educational training -other occupation	Return to: -previous occupation	Row Total
AHC	32 (40.0%)	14 (17.5%)	34 (42.5%)	80
WCB	10 (43.5%)	7 (30.4%)	6 (26.1%)	23
Insurance	6 (42.9%)	4 (28.6%)	4 (28.6%)	14
Employer	2 (28.6%)	3 (42.9%)	2 (28.6%)	7

Ehrmann-Feldman et al. (1996) found that the length of physical therapy treatment was related to gender and time off work. Neither of these variables were included in the regression analysis to predict length of treatment in the current study.

The relationship between the treatment clinic attended and the length of treatment

In addition to the t-test shown in Table 2, Pearson correlation coefficients did not indicate a significant relationship between clinic attended and length of treatment ($r = .06$, $p = .497$). The average length of treatment was 8.6 weeks at the multidisciplinary clinic and 9.1 weeks at the physical therapy clinic (Table 2).

Ehrmann-Feldman (1996) evaluated a group of 389 subjects with low back pain who were referred for physical therapy treatment. The average duration of physical therapy treatment in their study was 48.3 calendar days, or approximately 7 weeks. The longer duration of treatment in the current study may be partially explained by the

difference in subjects. Subjects who received physical therapy in the Ehrmann-Feldman study had been off work for more than 1 month and subjects who received back surgery were excluded. Chronicity in their study was defined as being off work for 6 months or longer, although their subjects were not limited to chronic cases. They did not indicate the number of their subjects who were considered chronic, or the average length of time that their subjects were off work. In the current study, the average length of time off work was 14.9 months for subjects from the multidisciplinary clinic and 5.5 months for subjects from the physical therapy clinic. It is, therefore, possible that the subjects from the Ehrmann-Feldman study were not as chronic as those included in the present study.

Integral to the length of rehabilitation treatment are the decisions made regarding discharge. The criteria for discharge from rehabilitation has been the subject of discussion in the literature (Feuerstein, 1991). Length of treatment may be affected by a number of factors including the perception of progress or lack of progress in the opinion of both the clinicians and the client, the source of funding, and other socio-economic factors including the client's employment situation. In the present study, there is no way to determine whether the same criteria for discharge were used at both of the clinics. However, based on the finding that there was no significant difference between the length of treatment at the two clinics, it may be that similar criteria were used to determine discharge.

The relationship between length of treatment and return to work

Pearson correlation coefficients did not indicate a significant relationship between the length of treatment and return to work ($r = -.10$, $p = .288$). This has implications for clinicians as well as the funding agencies. There may be several reasons for this weak relationship. Persons who are more disabled by their pain are less likely to return to work and therefore the focus of their rehabilitation may be to address other aspects of their condition (i.e. coping strategies, relaxation, and pain management) and this may prolong treatment. Another explanation may be that persons who remain attached to their jobs are less likely to be able to attend rehabilitation for a prolonged

period of time. Whether maximum rehabilitation potential can be reached in this population within a certain period of time is not known. However, the length of time spent in rehabilitation has implications for the agencies who fund rehabilitation, particularly if physical improvement plateaus after a certain length of time beyond which there is little functional improvement. The results of Dionne et al. (1994) appear to suggest that this is the case. The investigators found that, five years following discharge from a multidisciplinary program, there was no improvement in SIP scores or return to work status for subjects who had attended the program for longer than a 111 day length of treatment. Although it is difficult to conclude that the return to work status of subjects five years following discharge from rehabilitation is due entirely to lasting effects from rehabilitation. The return to work status of the subjects immediately following discharge from rehabilitation was not included. As the investigators note, the five-year work status of the subjects may be influenced by a number of other factors.

The relationship between the treatment clinic attended and return to work

Pearson correlation coefficients indicated a significant relationship between clinic attended and return to work ($r = .44$, $p = .000$). Clients from the physical therapy clinic returned to their previous occupation in proportionately greater numbers than clients who attended the multidisciplinary clinic (Table 11). The results may be partially explained by the initial differences between the clients from the two clinics. Clients from the multidisciplinary clinic had been off work longer than those from the physical therapy clinic.

In order to investigate whether the initial differences in client characteristics from the two clinics may have influenced return to work, the raw score regression weight was analyzed (Table 16). When all other client characteristics were held constant, an improvement in return to work was found for the subjects who attended the physical therapy clinic. The results of this method of analysis should be interpreted with caution, however, because the return to work variable was categorical and the

improvement in return to work (.419) does not represent a full interval between levels of outcome.

Table 11: Frequency and percent ( ) of return to work outcome by clinic. Chi-square significance values are included.

	CLINIC 1 Multidisciplinary (n = 63)	CLINIC 2 Physical Therapy (n = 61)	TOTAL (n = 124)	Sig.
Return to Previous Employment	10 (15.9)	36 (59.0)	46 (37.1)	.0001
Return to Other Employment	4 (6.3)	3 (4.9)	7 (5.6)	*
Education/Vocational Training	5 (7.9)	1 (1.6)	6 (4.8)	*
Modified/Light Duties	8 (12.7)	7 (11.5)	15 (12.1)	.796
No Return to Employment	36 (57.1)	14 (23.0)	50 (40.3)	.002

* There are fewer than 5 cases per cell rendering the chi-square analysis unreliable.

The relationship between the independent variables and return to work

Pearson correlations indicated seven independent variables that were significantly related to return to work (see Appendix E). These variables were (in order of significance): 1) length of time the client had been off work (r = -.62), 2) pain-focused behavior (r = .60), 3) the age of the client (r = -.41), 4) whether the client had received previous rehabilitation (r = -.32), 5) whether the client had pain other than low back pain (r = .27), 6) occupation of the client (r = -.23), and 7) whether the client was involved in litigation arising from the incident that resulted in low back pain (r = .22). When each of the independent variables was paired with the clinic attended in a forced-entry regression equation, all of the correlations were significant (see Appendix F).

A stepwise regression analysis revealed four independent variables that were significantly related to return to work. The variables entered in the regression equation

were (in order): 1) the length of time the client was off work, 2) pain-focused behavior, 3) age, and 4) occupation. The improvement in variance explained with the inclusion of the subsequent variables in the stepwise regression equation is shown in Table 12. In addition to the variables identified in the stepwise regression as predictors of return to work, two others were included in the forced-entry regression analysis (Table 16). These variables were: previous rehabilitation, and whether the client felt that the previous rehabilitation had been helpful.

Table 12: Results of stepwise regression analysis used to predict return to work from independent variables.

Step	Independent Variable	Multiple R	R^2	Sig.
1	Time off work	.616	.379	.0000
2	Pain focused	.740	.548	.0000
3	Age	.759	.576	.0000
4	Occupation	.771	.594	.0000

The length of time off work was a significant predictor of return to work. The results of the current study revealed that no subject who had been off work longer than 14 months returned to their previous occupation. These results support the findings of previous studies that have found that the likelihood of returning to work decreases with the length of time the client is off work (Cats-Baril & Frymoyer, 1991; Ehrmann-Feldman et al., 1996).

Pain-focused behavior was significantly correlated with return to work. Generally, pain-focused behavior is the clinician's opinion of how appropriately the clients deal with their pain. It is considered to be an indication of the level of coping that the client demonstrates. It is not a standardized measurement tool, but a global rating of a client's pain behaviors. However, it was relatively highly correlated with both treatment clinic referral and return to work following rehabilitation. This appears to indicate that pain-focused behavior is a relatively accurate indicator of eventual

outcome, and that pain-focused behavior may be a valuable tool when assessing clients. Due to its relationship with return to work, the relationship was analyzed using a cross-tabs procedure (see Table 13). The majority of clients who were pain-focused did not return to employment following rehabilitation. The influence of pain focused behavior on return to work was analyzed using raw score regression weights (Table 16). There was a .54 improvement in return to work for clients who were not pain focused compared to those who demonstrated pain focused behavior. Again, it must be noted that return to work is a categorical variable and therefore the direct influence of pain focused behavior on return to work should be interpreted with caution.

Table 13: Return to work following rehabilitation for clients who are pain-focused and those who are not.

Behavior	No return to work	Return to: -modified/light duties -educational training -other occupation	Return to: -previous occupation	Row Total
Pain-focused	44 (68.8%)	11 (17.2%)	9 (14.1%)	64
Not Pain-focused	6 (10.0%)	17 (28.3%)	37 (61.7%)	60

The influence of age on return to work was analyzed using raw score regression weights (Table 16). The results of this analysis revealed that increasing age (measured in years) resulted in a decreased likelihood of returning to work. For each year of age increase, there was a corresponding decrease in return to work of -.016 units when all other variables were held constant. Again, it must be noted that return to work is a categorical variable.

The relationship between occupation and return to work was analyzed using a cross-tabs procedure (see Table 14). The proportion of clients who return to their previous occupations decreases as the physical job demands increase. This supports the findings in the literature that indicate as physical job demands increase, the likelihood of returning to work decreases.

Table 14: The relationship between physical job demands and return to work following rehabilitation.

Physical Demands	No return to work	Return to: -modified/light duties -educational training -other occupation	Return to: -previous occupation	Row Total
Sedentary	5 (20.8%)	5 (20.8%)	14 (58.3%)	24
Light	11 (45.8%)	3 (12.5%)	10 (41.7%)	24
Medium	25 (43.1%)	14 (24.1%)	19 (32.8%)	58
Heavy	8 (57.1%)	3 (21.4%)	3 (21.4%)	14
Very Heavy	1 (25.0%)	3 (75%)	0	4

The influence of litigation on return to work was assessed using a cross-tabs procedure (Table 15). In addition, raw score regression weights were assessed (Table 16) to evaluate the influence of litigation on return to work. When a subject was not involved in litigation, there was a .37 improvement in return to work following rehabilitation. Again, caution should be used when interpreting this value since return to work is a categorical variable and the influence of litigation represents less than one increment. Still, the value indicates that there is an influence of litigation that is present when all other independent variables are held constant.

Table 15: Return to work following rehabilitation for clients who are litigating and those who are not.

	No return to work	Return to: -modified/light duties -educational training -other occupation	Return to: -previous occupation	Row Total
Litigating	33 (50.0%)	14 (21.2%)	19 (28.8%)	66
Not Litigating	17 (29.3%)	14 (24.1%)	27 (46.6%)	58

Table 16: Significance of independent variables and raw score regression weights from forced-entry regression analysis to predict return to work.

VARIABLE	Sig.	Weight
Time off work	.0000	-.026
Pain focused behavior	.0001	.536
Age	.0045	-.019
Previous Rehabilitation	.0281	-.416
Previous Rehab Helpful	.0400	.271
Occupation	.1357	-.096
Length of Pain	.3424	.002
Litigation	.3727	.149
Funding - AHC	.4585	.178
Funding - Insurance	.6096	.143
Gender	.7614	-.040
Funding - WCB	.7661	-.077
Surgery	.7891	.032
Cause - Insidious	.8289	-.055
Additional Pain	.8434	-.034
Cause - MVA	.9242	-.027
Cause - Work	.9933	.002
* Clinic	.0008	.419

* Value for clinic was obtained from a separate forced-regression analysis where clinic was included with the independent variables.

The relationship between previous rehabilitation and return to work was analyzed using a cross-tabs procedure (see Table 17). Of those clients who had not received previous rehabilitation, the majority returned to their previous occupation. Of those who had received previous rehabilitation and found it helpful, 42.5% returned to their previous occupation. Of those who had received previous rehabilitation but had

not found it helpful, 23.1% returned to their previous employment. The extent of the relationship between previous rehabilitation and return to work is unclear. The reasons that the clients felt that their rehabilitation had not been helpful were not available. It is possible that those clients who had not found previous rehabilitation helpful may have had a more serious or extensive condition for which rehabilitation efforts had not been successful.

Table 17: The relationship between previous rehabilitation and return to work.

Previous Rehabilitation	No return to work	Return to: -modified/light duties -educational training -other occupation	Return to: -previous occupation	Row Total
Helpful	10 (25.0%)	13 (32.5%)	17 (42.5%)	40
Not Helpful	38 (58.5%)	12 (18.5%)	15 (23.1%)	65
No Prior Rehabilitation	2 (10.5%)	3 (15.8%)	14 (73.7%)	19

The results of the current study included the return to work status of clients at the point of discharge from rehabilitation. No follow-up was done following discharge to determine whether the discharge destination had changed.

Factor Analysis of Independent Variables

A factor analysis was conducted with the independent variables to examine the interrelationships among the independent variables. Initially, the independent variables were divided into conceptually similar clusters (see Table 18). Group 1 was composed of factors that were considered fixed. Group 2 was composed of factors that were related to the cause of onset of low back pain. Group 3 was composed of factors that were related to the course of the low back pain episode.

Table 18: The groups of independent variables used in the factor analysis.

GROUP 1	GROUP 2	GROUP 3
Age	Litigation	Previous rehabilitation
Gender	Cause of Pain	Pain focused behavior
Occupation		Time off work
Funding		Surgery
		Length of pain
		Additional pain

The factor analysis was performed in order to examine the relationships between the variables within each group to determine whether the group of variables may be explained by a smaller number of factors. The analysis revealed that the variables in Group 1 can be explained by three factors, Group 2 by two factors, and Group 3 by three factors (see Table 19).

The rotated factor matrix values contained in Table 18 indicate the weights of the variables on each factor. Within Group 1, age loads highly on factor 3 and it acts alone on that factor. Age does not form any significant Pearson correlations with the other variables in Group 1 (Appendix H), indicating that it is not strongly correlated with the other variables. Gender, occupation, and funding (WCB) load on factor 1. These three variables are relatively highly correlated with each other and would be expected to load strongly on the same factor. They are not as strongly correlated with other variables in Group 1 as they are with each other. The remaining funding sources (AHC and Insurance) load strongly on factor 2, although AHC loads relatively highly on factor 1 as well.

In Group 2, litigation and cause (MVA) load strongly on factor 1. These two variables are highly correlated and frequently occur together. Insidious onset of pain and work-related onset of pain loaded strongly on factor 2. The Pearson correlation values for the causes of onset were all related because when one cause existed, the others did not in the same subject. In spite of the strong inter-correlations, insidious onset and work onset of pain were more strongly related in the context of the other variables included in Group 1.

Table 19: Factor weights of variables used in the factor analysis obtained from the rotated factor matrix.

		Factor 1	Factor 2	Factor 3
Group 1	Age	.020	.061	**.820**
	Gender	**-.615**	-.030	-.452
	Occupation	**.732**	-.095	.271
	Funding			
	AHC	-.620	**-.717**	.122
	WCB	**.826**	.072	-.288
	Insurance	-.155	**.932**	.131
Group 2	Litigation	**.853**	.062	
	Cause of Pain			
	Gradual	.571	**.753**	
	MVA	**-.933**	.219	
	Work	.432	**-.870**	
Group 3	Previous rehabilitation	-.531	.120	**.669**
	Helpful	.204	.028	**.852**
	Pain focused behavior	**.795**	.008	.209
	Time off work	-.534	**.602**	-.071
	Surgery	.085	**.799**	-.073
	Length of pain	.063	**.729**	.345
	Additional pain	**.704**	.082	-.118

* bold figures indicate the factor where the variable loaded the highest

In Group 3, previous rehabilitation and whether it had been helpful loaded together on factor 3. Pearson correlation values indicated a significant correlation between previous rehabilitation and whether the rehabilitation had been successful. Pain focused behavior and additional pain loaded together on factor 1. This suggests that the demonstration of pain focused behavior is related to the presence of additional pain and in fact the Pearson correlation value indicates a significant correlation between the two. It is reasonable to suggest that persons who report additional pain to their therapists may also be likely to demonstrate pain focused behavior. Length of pain, surgery, and time off work load together on factor 2 and Pearson correlation values amongst these three variables are also significant. These three variables represent aspects of severity of the condition and would be expected to be related.

Assessing the Fit of the Model - LISREL Analysis

The model was examined using the correlation values corresponding to the relationships in the model (Figure 2). A LISREL analysis was also conducted in order to evaluate the fit of the mathematical model constructed from the data (Table 20).

An initial analysis was carried out using the complete set of variables (Tables 20 and 21). Several of the independent variables had no significant coefficients ($p \geq .20$). Paths involving these coefficients were eliminated and the data was reanalyzed. The results are shown in Tables 22 and 23.

The model was assessed in terms of three endogenous variables: return to work, length of treatment, and treatment clinic attended. Based on the level of significance, factors were sequentially excluded from the model. In this case, it is desirable for there to be no significant difference between the model and the data. As the factors were progressively dropped from the model, the fit became less accurate. However, the fit of the model remained acceptable for the model shown in Table 22.

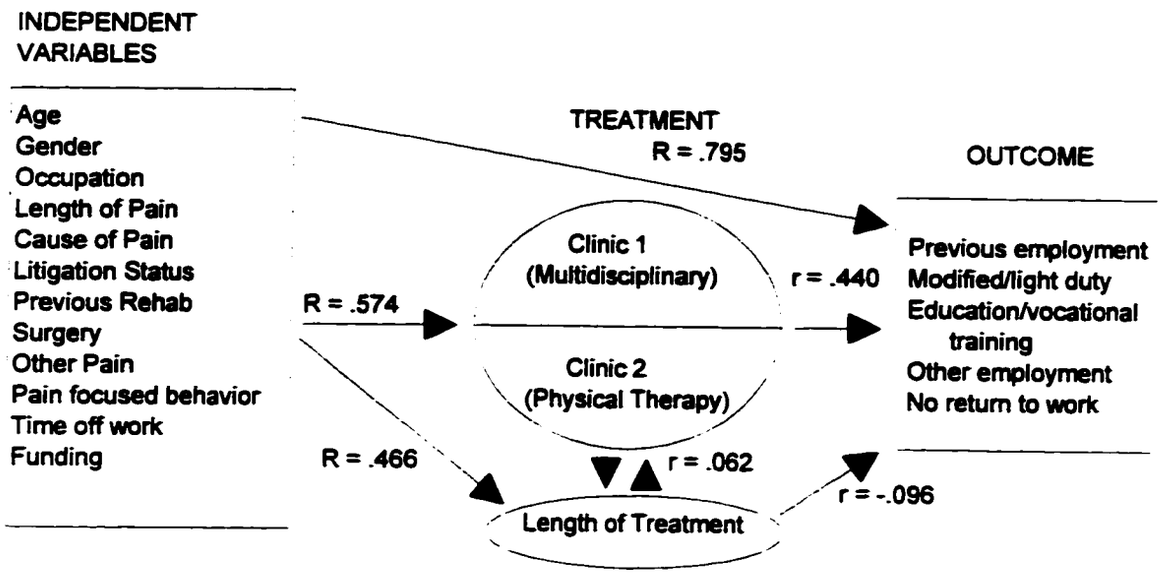

Figure 2: The model of the study presented with the correlation values from the forced multiple regression analysis (R) and from the Pearson correlations (r) that correspond to each relationship examined.

The coefficient relating return to work and length of treatment was not significant, and so this variable was eliminated from the model as well as other non-significant ($p = .20$) paths. The resulting model is shown in Tables 22 and 23. The chi-square was not significant indicating that length of treatment did not seem important for model fit. The resulting coefficients are shown in Table 23. The important factors related to return to work were clinic attended, age, and time off work. The important factors related to clinic attended were source of funding, previous rehabilitation, and time off work.

Table 20: Results of the LISREL analysis using the complete set of variables.

R^2						Variables Included
Return to Work	Length of Treatment	Clinic	Chi-square	sig.	df	
.669	.209	.324	3.89	>.99	19	Age Occupation Gender Funding (AHC, WCB, Insurance) Litigation Cause (MVA, Work, Insidious) Previous Rehab Additional Pain Pain Focused Time Off Work Surgery Length of Pain

Table 21: Path coefficients for variables included in the analysis.

Variable	Return to Work	Length of Treatment	Clinic
Age	-.016	.000	-.007
Occupation	-.072	.399	-.046
Gender	.000	.720	.000
Funding - WCB	-.302	2.444	.576
Funding - Insurance	-.139	5.075	.720
Funding - AHC	.000	2.440	.552
Litigation	.120	.000	.000
Cause - MVA	.000	.000	.074
Cause - Work	.000	.000	.336
Cause - Gradual	.000	.000	.156
Previous Rehab	-.243	1.553	-.400
Rehab Helpful	.236	.000	.000
Additional Pain	.000	.000	.134
Pain focused	.573	-2.029	-.036
Time off work	-.022	-.029	-.007
Surgery	.000	1.263	.000
Length of Pain	.002	-.011	.000

Table 22: Results of the LISREL analysis using the reduced set of variables.

R^2						Variables Included
Return to Work	Length of Treatment	Clinic	Chi-square	sig.	df	
.649	—	.294	6.93	.54	8	Age Occupation Funding (AHC, WCB, Insurance) Cause (Work) Previous Rehab Pain Focused Time Off Work

Table 23: Path coefficients for variables included in the analysis.

Variable	Return to Work	Clinic
Age	-.016	.000
Occupation	-.086	.000
Funding - WCB	-.205	.533
Funding - Insurance	.000	.693
Funding - AHC	.000	.532
Cause - Work	.000	.206
Previous Rehab	.000	-.473
Rehab Helpful	.175	.000
Pain focused	.674	.000
Time off work	-.021	-.010

The results of the LISREL analysis revealed that the fit of the model accurately represents the data in the current study. In order to assess the true predictive value of the model, however, a new data set would need to be used in the model. In this way, the accuracy of the model to predict return to work, length of treatment, and treatment clinic referral could be evaluated.

Summary of Discussion

The current study supports the work of previous authors (Cats-Baril & Frymoyer, 1991) and indicates that non-physical factors play a significant role in the outcome of clients with chronic low back pain. In addition, the current study appears to indicate that non-physical factors influence both the rehabilitation referral patterns and the length of time spent in rehabilitation.

Whether clinicians determine that a client demonstrates pain-focused behavior or not appears to be significantly related to both length of treatment and outcome following rehabilitation. This is not a standardized measure, but rather a global judgment based on the client's clinical presentation. It appears that clinicians' judgment of clients' pain behaviors is one that has predictive ability for prolonged disability.

The current study appears to support the general opinion that multidisciplinary clinics are the treatment of last resort for clients with chronic low back pain. The clients who were treated at the multidisciplinary clinic were older, had been off work longer, and were more likely to have received previous rehabilitation than those who attended the physical therapy clinic. The subsequent outcome following rehabilitation for subjects from the two clinics was markedly different with 59.0% of subjects from the physical therapy clinic returning to their previous occupation compared to 15.9% of those from the multidisciplinary clinic.

Length of treatment appears to have had little impact on return to work in the current study. This finding has implications for funding agencies who pay for rehabilitation services. Most often the goal for rehabilitation is a return to productive employment. These results appear to suggest that return to work should not be the sole outcome measure in this population. Whether there is an optimal length for rehabilitation beyond which there is little improvement is not known.

There are many client characteristics that affect return to work. Many are not included in the current study, however the variables included in these results appear to explain a significant amount of the variance in the outcomes. These results support the

work of previous authors who have found that a variety of factors, both physical and psychosocial, affect the outcome of this population.

Clinical Relevance

Persons diagnosed with chronic low back pain and resulting disability present a challenge to physical therapists who typically play a central role in the management of these clients. There is increasing pressure to manage this population in an efficient and cost-effective manner in order to avoid prolonged disability and loss of productivity in the workplace. The costs associated with low back pain are increasing in developed countries in spite of the increasing awareness of the condition, and advances in diagnoses and prevention. The general consensus in the literature is that ongoing low back pain and disability consists of both physical and psycho-social components.

Many factors are associated with chronic low back pain and associated disability. Certain characteristics are known to influence treatment effectiveness and eventual outcome of persons with chronic low back pain. Other characteristics are thought to influence the outcome of these clients, however their roles in prolonged disability have not been conclusively studied. If the characteristics of persons with chronic low back pain and associated disability could be more accurately described, it may be possible to more accurately define the condition. Furthermore, knowing the affected population, it may be possible to direct treatment more accurately towards these persons. It may also be possible to identify persons who are at a high risk for developing prolonged disability early on in their condition. Knowing the affected population, appropriate treatment could be targeted towards those individuals. These clients could be provided, as indicated, with comprehensive rehabilitation to address the multi-dimensional nature of chronic pain.

CHAPTER FIVE

SUMMARY AND CONCLUSIONS

Summary

The purpose of this study was to determine whether the characteristics of persons with chronic low back pain influenced the treatment clinic to which they were referred, the length of treatment they received, and their return to work status following rehabilitation.

Subjects were 124 individuals who had attended a multidisciplinary rehabilitation clinic (n=63) or a physical therapy clinic (n=61) for the treatment of chronic low back pain. Subjects were between the ages of 16 and 65, were employed prior to the onset of low back pain, and had suffered from low back pain for at least 6 months prior to starting rehabilitation treatment at either of the two clinics in the study. The medical files of the subjects were reviewed to collect the following information: age, gender, occupation, duration of low back pain, cause of low back pain, previous physical therapy and whether it had been helpful, surgery related to the low back pain or its symptoms, litigation status relating to the onset of low back pain, additional pain (pain other than low back pain), time off work, funding for rehabilitation, length of rehabilitation treatment, whether the subject demonstrated pain focused behavior, and return to work status following rehabilitation.

Subjects from the two clinics were compared using t-test analyses for continuous data, and by chi-square analyses for categorical data. Pearson correlations were calculated in order to assess the relationship between individual variables. Statistical significance level was set at .05. Multiple regression analyses (stepwise and forced) were conducted to determine the predictive value of a set of characteristics. A factor analysis was conducted in order to determine whether the set of characteristics used may be reduced to a smaller number of factors.

Differences between subjects from the two clinics reached statistical significance based on age and the length of time they were off work. The results of the study reveal that certain characteristics affect the treatment clinic referral, the length of treatment, and return to work. Stepwise regression analysis included the following independent variables in the prediction of treatment clinic attended: previous rehabilitation, and time off work ($r^2 = .191$). The length of treatment was influenced by two variables: pain focused behavior, and type of funding ($r^2 = .124$). Return to work following rehabilitation was influenced by five variables: time off work, pain focused behavior, clinic attended, age, and occupation ($r^2 = .640$). There was no significant correlation between treatment clinic attended and the length of treatment ($r = .0615$, $p = .497$), or between the length of treatment and return to work ($r = -.0962$, $p = .288$). Significantly more subjects from the physical therapy clinic (59.0%) returned to their previous employment than those from the multidisciplinary clinic (15.9%).

While there appears to be a significant difference in return to work for subjects from the two clinics, this difference may be explained by initial differences in the characteristics of those persons who are referred to each of the clinics.

Conclusions

The following conclusions can be drawn based on the results of this study:

1. Persons referred to the multidisciplinary rehabilitation clinic differed from those referred to the physical therapy clinic based on age, the length of time they had been off work, and whether they had received previous physical therapy treatment.
2. Persons who received rehabilitation treatment at the physical therapy clinic returned to their pre-injury jobs more frequently than those who received treatment at the multidisciplinary clinic.
3. Treatment clinic referral, length of treatment, and return to work following rehabilitation were correlated with characteristics of persons with chronic low back pain. Treatment clinic referral was influenced by: having received previous rehabilitation, and length of work absence. The length of treatment was influenced

by: pain focused behavior, and source of funding. Return to work following rehabilitation was influenced by: length of time off work, pain focused behavior, clinic attended, age, and occupation.

4. There was no significant correlation between the length of rehabilitation treatment received and the clinic attended.
5. There was no significant correlation between the length of rehabilitation treatment received and return to work following rehabilitation.

Recommendations for Further Study

On the basis of this study, the following recommendations for further study are presented:

1. The referral patterns of persons with chronic low back pain by physicians should be investigated to determine how decisions are made regarding rehabilitation treatment.
2. Physical therapy outcome measures for the treatment of persons with chronic low back pain should be evaluated, including the attitudes and expectations of clients. In the current study 61.9% of subjects who had received previous physical therapy treatment for their low back pain reported that it was not helpful. It is not known whether the same results would be found at other clinics.
3. The criteria by which clinicians determine whether their clients are pain focused should be evaluated. Pain focused behavior was a relatively strong predictor of both length of treatment and return to work
4. The criteria for the discharge of persons with chronic low back pain from rehabilitation should be investigated. Length of treatment was not a strong predictor of return to work.

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APPENDIX A

Occupational Classification

Level	Category	Maximum Lift (lb.)	Frequent Lifting (lb.)
1	Sedentary	10	< 10
2	Light	20	≤ 10
3	Medium	50	≤ 20
4	Heavy	100	≤ 50
5	Very heavy	> 100	≥ 50

Sedentary work requires a maximum lift of 10 lb. and occasional lifting and/or carrying of small articles such as dockets, ledgers, and small tools. Sedentary occupations are defined as those that involve primarily sitting, however a certain amount of walking and standing is often required in carrying out job duties. Occupations are considered sedentary if walking and standing are required only occasionally. Light level work requires a maximum lift of up to 20 lb. and frequent lifting and/or carrying of objects weighing up to 10 lb. An occupation is considered light when it requires walking or standing to a significant degree, or when it involves sitting most of the time with a degree of pushing and pulling of arm and/or leg controls. Medium level work requires a maximum lift of up to 50 lb. and frequent lifting and/or carrying of objects weighing up to 20 lb. Heavy level work requires lifting of up to 100 lb. maximum with frequent lifting and/or carrying of objects weighing up to 50 lb. Very heavy work involves lifting objects in excess of 100 lb. with frequent lifting and/or carrying of objects weighing 50 lb. or more.

Source: Canadian Classification and Dictionary of Occupations, 9 ed. (1989). p. 412-413. Canadian Government Publishing Centre, Supply and Services Canada.

APPENDIX B

Letters of Support

GROSS
Rehabilitation
Centre

- Medicine
- Psychology
- Physical Therapy
- Occupational Therapy
- Exercise Physiology
- Vocational Services
- Life Skills Management

January 29, 1996

Ms. S. Mengering
Department of Physical Therapy
University of Alberta
Edmonton, Alberta
T6G 2M7

Dear Ms. Mengering:

I strongly support your proposed study entitled: Factors that predict outcome in patients with chronic low back pain. The issues related to the outcome of this patient population are of significant consequence when designing managed care service delivery care maps, and are of imperative importance for investigation.

The Gross Rehabilitation Centre will play a supportive role in accessing patients for the proposed study.

Yours sincerely,

E.Lyle Gross, B.Sc. (Hons), M.Sc., M.D., F.R.C.P.,(C)
Specialist in Physical Medicine and Rehabilitation
Chairperson, Capital Health Authority Chronic Pain Committee

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#408, 11010 - 101 Street, Edmonton, Alberta T5H 4B8
Telephone (403) 429-4636 Fax (403) 429-4909

January 31, 1996

Ms. S. Mengering
Department of Physical Therapy
University of Alberta
Edmonton, Alberta
T6G 2M7

Dear Ms. Mengering:

Thank-you for showing me your proposed study: Factors that predict outcome in patients with chronic low back pain. The factors you are planning to study are critical to successful treatment of these patients in daily practice.

I believe the information you find can only benefit improved care of these clients. I strongly support your proposed study.

Yours Sincerely,

David van Driesum B.Sc.P.T./B.P.E.
Hys Centre Physical Therapy Ltd.

APPENDIX C

Pearson correlations of independent variables with Clinic attended.

Independent Variable	Pearson r	r^2	Sig.
1. Rehab 1 (previous rehab)	-.343	.117	.0001
2. Offwork	-.338	.114	.0001
3. Age	-.214	.046	.0171
4. Funding - WCB	.194	.038	.0305
5. Additional Pain	.183	.033	.0425
6. Cause - MVA	-.182	.033	.0426
7. Pain Focus	.145	.021	.1088
8. Litigation	.144	.021	.1095
9. Cause - Work	.131	.017	.1459
10. Funding - AHC	-.130	.017	.1514
11. Cause - Insidious	.111	.012	.2178
12. Funding - Insurance	.108	.012	.2338
13. Length of Pain	-.100	.010	.2708
14. Occupation	-.085	.007	.3469
15. Surgery	-.073	.005	.4225
16. Length of Treatment	.062	.004	.4971
17. Rehab 2 (helpful or not)	-.023	.001	.7966
18. Gender	-.017	.000	.8543

APPENDIX D

Pearson correlations of independent variables with length of treatment.

Independent Variable	Pearson r	r^2	Sig.
1. Pain Focus	-.273	.075	.002
2. Funding - Insurance	.258	.066	.004
3. Rehab 1 (previous rehab)	.185	.034	.040
4. Funding - AHC	-.107	.012	.237
5. Surgery	.084	.007	.351
6. Cause - Insidious	-.083	.007	.358
7. Length of Pain	-.076	.006	.400
8. Occupation	.074	.005	.417
9. Litigation	-.072	.005	.425
10. Rehab 2 (helpful or not)	-.063	.004	.486
11. Funding - WCB	.062	.004	.497
12. Clinic	.062	.004	.497
13. Additional Pain	-.059	.003	.518
14. Gender	.057	.003	.529
15. Cause - MVA	.053	.003	.557
16. Cause - Work	-.025	.001	.783
17. Time off work	.020	.000	.824
18. Age	.004	.000	.964

APPENDIX E

Pearson correlations of independent variables used to predict return to work.

Independent Variable	Pearson r	r^2	Sig.
1. Offwork	-.616	.379	.0000
2. Pain Focus	.604	.365	.0000
3. Clinic	.440	.193	.0000
4. Age	-.412	.169	.0000
5. Rehab 1 (previous rehab)	-.321	.103	.0003
6. Additional Pain	.265	.070	.0029
7. Occupation	-.230	.053	.0103
8. Litigation	.218	.048	.0149
9. Cause - Insidious	.183	.033	.0423
10. Rehab 2 (helpful or not)	.163	.026	.0711
11. Cause - MVA	-.099	.010	.2743
12. Length of Treatment	-.096	.009	.2879
13. Surgery	-.094	.009	.2998
14. Gender	.091	.008	.3171
15. Fund - WCB	-.077	.006	.3961
16. Cause - Work	-.072	.005	.4288
17. Funding - AHC	.068	.005	.4551
18. Length of Pain	-.053	.003	.5568
19. Funding - Insurance	-.045	.002	.6207

APPENDIX F

Correlations of independent variables combined with Clinic attended to predict return to work.

Independent Variable + Clinic	Pearson r	r^2	Sig.
1. Pain Focus	.701	.492	.0000
2. Offwork	.663	.440	.0000
3. Age	.547	.299	.0000
4. Occupation	.480	.230	.0000
5. Additional Pain	.478	.229	.0000
6. Rehab 1 (previous rehab)	.476	.226	.0000
7. Rehab 2 (helpful or not)	.473	.223	.0000
8. Fund WCB	.470	.221	.0000
9. Litigation	.467	.218	.0000
10. Cause Insidious	.460	.211	.0000
11. Cause Work	.459	.210	.0000
12. Func AHC	.457	.209	.0000
13. Length of Rx	.457	.209	.0000
14. Gender	.450	.203	.0000
15. Fund Insurance	.449	.202	.0000
16. Surgery	.444	.197	.0000
17. Cause MVA	.440	.194	.0000
18. Length of Pain	.440	.193	.0000

APPENDIX G

Correlations of independent variables combined with length of treatment to predict return to work.

Independent Variable + Length of Treatment	Pearson r	r^2	Sig.
1. Time off work	.621	.386	.0000
2. Pain focus	.609	.370	.0000
3. Clinic	.457	.209	.0000
4. Age	.422	.178	.0000
5. Rehab 1 (previous rehab)	.323	.105	.0013
6. Additional pain	.277	.077	.0079
7. Occupation	.243	.059	.0252
8. Litigation	.233	.054	.0345
9. Cause Insidious	.200	.040	.0847
10. Rehab 2 (helpful or not)	.184	.034	.1244
11. Gender	.136	.019	.3229
12. Cause MVA	.134	.018	.3317
13. Surgery	.129	.017	.3620
14. Cause Work	.121	.015	.4071
15. Fund WCB	.120	.014	.4182
16. Length of Pain	.114	.013	.4546
17. Fund AHC	.112	.013	.4648
18. Fund Insurance	.098	.010	.5550

APPENDIX H

Pearson correlation matrix of variables with significance ( ).

	Add. Pain	Age	Cause Insid.	Cause MVA	Cause Work	Clinic	Fund. AHC	Fund. Insur.	Fund. WCB	Gender
Add. Pain	1.00	-.056 (.535)	.186 (.039)	-.284 (.001)	-.029 (.753)	.183 (.042)	-.079 (.381)	-.018 (.844)	.016 (.857)	-.030 (.743)
Age	-.056 (.535)	1.00	-.006 (.945)	-.097 (.283)	.114 (.209)	-.214 (.017)	-.052 (.565)	.038 (.672)	.029 (.746)	-.113 (.211)
Cause Insid.	.186 (.039)	-.006 (.945)	1.00	-.406 (.000)	-.335 (.000)	.112 (.218)	.015 (.869)	.158 (.081)	-.228 (.011)	.119 (.187)
Cause MVA	-.284 (.001)	-.097 (.283)	-.406 (.000)	1.00	-.597 (.000)	-.182 (.043)	.438 (.000)	-.045 (.620)	-.364 (.000)	.191 (.034)
Cause Work	-.029 (.753)	.114 (.209)	-.335 (.000)	-.597 (.000)	1.00	.131 (.146)	-.468 (.000)	-.142 (.115)	.635 (.000)	-.303 (.001)
Clinic	.183 (.042)	-.214 (.017)	.112 (.218)	-.182 (.043)	.131 (.146)	1.00	-.130 (.151)	.108 (.234)	.195 (.030)	-.017 (.854)
Fund AHC	-.079 (.381)	-.052 (.565)	.015 (.869)	.438 (.000)	-.468 (.000)	-.130 (.151)	1.00	-.473 (.000)	-.632 (.000)	.295 (.001)
Fund Insur.	-.018 (.844)	.038 (.672)	.158 (.081)	-.045 (.620)	-.142 (.115)	.108 (.234)	-.473 (.000)	1.00	-.170 (.059)	-.040 (.663)
Fund WCB	.016 (.857)	.029 (.746)	-.228 (.011)	-.364 (.000)	.635 (.000)	.195 (.030)	-.632 (.000)	-.170 (.059)	1.00	-.213 (.018)
Gender	-.030 (.743)	-.113 (.211)	.119 (.187)	.191 (.034)	-.303 (.001)	-.017 (.854)	.295 (.001)	-.040 (.663)	-.213 (.018)	1.00
Length Treatm.	-.059 (.518)	.004 (.964)	-.083 (.358)	.053 (.557)	-.025 (.783)	.062 (.497)	-.107 (.237)	.258 (.004)	.062 (.497)	.057 (.529)
Litiga-tion	.380 (.000)	.009 (.924)	.384 (.000)	-.666 (.000)	.234 (.009)	.144 (.109)	-.267 (.003)	-.079 (.383)	.218 (.015)	.030 (.739)
Length Pain	.038 (.677)	.160 (.076)	.007 (.936)	-.174 (.053)	.144 (.110)	-.100 (.271)	.066 (.465)	-.084 (.354)	-.047 (.602)	-.048 (.597)
Occup-ation	-.063 (.488)	.066 (.467)	-.258 (.004)	-.128 (.156)	.378 (.000)	-.085 (.347)	-.265 (.003)	-.034 (.710)	.350 (.000)	-.470 (.000)
Time off wk.	-.218 (.015)	.343 (.000)	-.095 (.294)	.072 (.429)	.011 (.905)	-.338 (.000)	.120 (.186)	-.047 (.607)	-.098 (.279)	-.019 (.838)
Pain focus	.277 (.002)	-.224 (.012)	.161 (.075)	-.136 (.132)	.006 (.951)	.145 (.109)	.127 (.161)	-.142 (.117)	-.088 (.329)	-.001 (.991)
Prev. Rehab.	-.300 (.001)	.175 (.053)	-.315 (.000)	.180 (.045)	.061 (.501)	-.343 (.000)	.145 (.109)	.010 (.910)	-.085 (.348)	.098 (.278)
Rehab Helpful	.073 (.423)	.080 (.380)	-.107 (.235)	-.027 (.765)	.138 (.125)	-.023 (.797)	.019 (.838)	-.083 (.361)	.070 (.439)	.160 (.075)
Return to work	.266 (.003)	-.412 (.000)	.183 (.042)	-.099 (.274)	-.072 (.429)	.440 (.000)	.068 (.455)	-.045 (.621)	-.077 (.396)	.091 (.317)
Surgery	.012 (.891)	.101 (.262)	-.011 (.906)	-.275 (.002)	.280 (.002)	-.073 (.423)	-.152 (.092)	-.030 (.744)	.151 (.095)	-.130 (.151)

APPENDIX H (Continued)

	Length Treat.	Litiga-tion	Length Pain	Occupa-tion	Time off wk.	Pain focus	Prev. Rehab	Rehab Helpful	Return to wk.	Surgery
Add. Pain	-.059 (.518)	.380 (.000)	.038 (.677)	-.063 (.488)	-.218 (.015)	.277 (.002)	-.300 (.001)	.073 (.423)	.266 (.003)	.012 (.891)
Age	.004 (.964)	.009 (.924)	.160 (.076)	.066 (.467)	.343 (.000)	-.224 (.012)	.175 (.053)	.080 (.380)	-.412 (.000)	.101 (.262)
Cause Insid.	-.083 (.358)	.384 (.000)	.007 (.936)	-.258 (.004)	-.095 (.294)	.161 (.075)	-.315 (.000)	-.107 (.235)	.183 (.042)	-.011 (.906)
Cause MVA	.053 (.557)	-.666 (.000)	-.174 (.053)	-.128 (.156)	.072 (.429)	-.136 (.132)	.180 (.045)	-.027 (.765)	-.099 (.274)	-.275 (.002)
Cause Work	-.025 (.783)	.234 (.009)	.144 (.110)	.378 (.000)	.011 (.905)	.006 (.951)	.061 (.501)	.138 (.125)	-.072 (.429)	.280 (.002)
Clinic	.062 (.497)	.144 (.109)	-.100 (.271)	-.085 (.347)	-.338 (.000)	.145 (.109)	-.343 (.000)	-.023 (.797)	.440 (.000)	-.073 (.423)
Fund AHC	-.107 (.237)	-.267 (.003)	.066 (.465)	-.265 (.003)	.120 (.186)	.127 (.161)	.145 (.109)	.019 (.838)	.068 (.455)	-.152 (.092)
Fund Insur.	.258 (.004)	-.079 (.383)	-.084 (.354)	-.034 (.710)	-.047 (.607)	-.142 (.117)	.010 (.910)	-.083 (.361)	-.045 (.621)	-.030 (.744)
Fund WCB	.062 (.497)	.218 (.015)	-.047 (.602)	.350 (.000)	-.098 (.279)	-.088 (.329)	-.085 (.348)	.070 (.439)	-.077 (.396)	.151 (.095)
Gender	.057 (.529)	.030 (.739)	-.048 (.597)	-.470 (.000)	-.019 (.838)	-.001 (.991)	.098 (.278)	.160 (.075)	.091 (.317)	-.130 (.151)
Length Treat.	1.00	-.072 (.425)	-.0762 (.400)	.074 (.417)	.020 (.824)	-.273 (.002)	.185 (.040)	-.063 (.486)	-.096 (.288)	.084 (.351)
Litiga-tion	-.072 (.425)	1.00	.087 (.335)	-.041 (.649)	-.106 (.240)	.224 (.012)	-.319 (.000)	-.025 (.787)	.218 (.015)	.259 (.004)
Length Pain	-.076 (.400)	.087 (.335)	1.00	.047 (.606)	.290 (.001)	.092 (.311)	.242 (.007)	.199 (.027)	-.053 (.557)	.330 (.000)
Occup-ation	.074 (.417)	-.041 (.649)	.047 (.606)	1.00	.178 (.049)	-.029 (.753)	.073 (.420)	.036 (.692)	-.230 (.010)	.219 (.015)
Time off wk.	.020 (.824)	-.106 (.240)	.290 (.001)	.178 (.049)	1.00	-.360 (.000)	.212 (.018)	-.031 (.733)	-.616 (.000)	.261 (.003)
Pain focus	-.273 (.002)	.224 (.012)	.092 (.311)	-.029 (.753)	-.360 (.000)	1.00	-.260 (.004)	.229 (.010)	.605 (.000)	.059 (.517)
Prev. Rehab.	.185 (.040)	-.319 (.000)	.242 (.007)	.073 (.420)	.212 (.018)	-.260 (.004)	1.00	.294 (.001)	-.321 (.000)	.066 (.464)
Rehab Helpful	-.063 (.486)	-.025 (.787)	.199 (.027)	.036 (.692)	-.031 (.733)	.229 (.010)	.294 (.001)	1.00	.163 (.071)	.020 (.830)
Return to wk.	-.096 (.288)	.218 (.015)	-.053 (.557)	-.230 (.010)	-.616 (.000)	.605 (.000)	-.321 (.000)	.163 (.071)	1.00	-.094 (.300)
Surgery	.084 (.351)	.259 (.004)	.330 (.000)	.219 (.015)	.261 (.003)	.059 (.517)	.066 (.464)	.020 (.830)	-.094 (.300)	1.00