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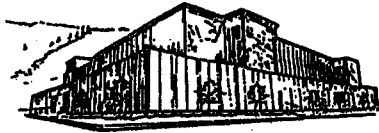
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A novel multidisciplinary approach to the treatment of chronic pain

by

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A novel multidisciplinary approach to the treatment of chronic pain

JK

Director: John W. Klocek

A meta-analysis of outcome studies involving multidisciplinary pain treatment centers found that individuals participating in such programs showed substantial improvement in pain intensity, pain behaviors, activity level, and use of medical services when compared to untreated controls (Flor, Fydrich, & Turk, 1992). Two central components of multidisciplinary chronic pain treatment are group cognitive-behavioral psychotherapy and physical therapy/exercise. While each modality addresses and reinforces the other, current treatment models find physical therapists and psychologists working relatively independently. The novel approach to treatment of chronic pain utilized in this study sought to further integrate the roles of the physical therapist and psychologist by extending the role of the psychologist into the exercise room, and by extending the role of the physical therapist to the group psychotherapy room. 18 participants with chronic pain attended four weeks of group psychotherapy/ psychoeducation and six weeks of physical therapy/exercise group. Increased collaboration between psychologists and physical therapists was provided for individuals in the experimental condition, while those in the control condition participated in each group without this enhancement. Participants completed measures of anxiety, kinesiophobia, depression, pain intensity, and disability at four-week intervals, muscular strength at six-week intervals, and weekly measures of treatment fidelity. Results were analyzed using ANOVA procedures to investigate the following hypotheses: 1) multidisciplinary pain treatment received by all participants will result in lower levels of anxiety, kinesiophobia, depression, pain, disability, and increased strength, and 2) individuals in the experimental condition will demonstrate greater improvement in levels of anxiety, kinesiophobia, depression, pain, disability, and strength when compared to those in the control condition. Results provide some support for hypothesis one, as treatment resulted in significant improvement of participants' mean pain related disability and chest strength over time. There were trends toward decreasing levels of pain related anxiety and kinesiophobia. Although hypothesis two was not generally supported, results suggest that experimental participants may have experienced greater improvements in depressive symptoms. Study limitations as well as implications for future research and clinical application are discussed.

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This project would not have been possible without the assistance of a number of peers and advisors. These individuals all contributed in unique ways, and I have learned a great deal from each of them. I would first like to thank my co-investigators, John W. Klocek, Ph.D., and James Laskin, P.T., Ph.D.. John has been involved with my dissertation project since day one. He has served not only as a co-investigator and chair, but also as my mentor. Most of what I know about behavioral management of chronic pain was learned working with John clinically, academically, and in research. He has provided unfailing support and guidance during all stages of my dissertation, and continual encouragement throughout my six years of graduate school. John has also helped me to appreciate “censoring”, a skill which I have used numerous times while working on this study. James Laskin has also contributed an enormous amount both professionally and personally to this project. He has demonstrated both patience and kindness, teaching myself and other project staff a great deal about physical therapy/exercise with individuals with chronic pain and physical disability. Collaboration with James and his students provided an outstanding example of what interdisciplinary treatment should be like. I would also like to thank Melody Huskey, M.A., project coordinator, and Jef West, research assistant. Melody and Jef have worked tirelessly since the beginning of this study. They have demonstrated a strong commitment to the project, taking the responsibility to ensure that all aspects ran smoothly. I have a tremendous amount of trust and respect for both of these individuals. I would also like to sincerely thank all of my peers who have run groups for the study. Thank you to Ellen Crouse, M.A., Jayde Pryzgoda, M.A., Evette Simmons, Loretta Grate and again, Melody Huskey, M.A. for all of your outstanding work. I am glad that each of you had the opportunity to practice in an area that I love, and have chosen as the focus of my career. Finally, I would like to express my appreciation to my remaining committee members, Christine Fiore, Ph.D., Stuart Hall, Ph.D., and Allen Szalda-Petree, Ph.D., who have contributed significantly to my dissertation, as well as to my clinical, research, and academic training throughout graduate school. Training with each of these individuals has not only assisted me in completing this project, but has also provided me with the skills that have led to success this year on my clinical internship. Although I am completing my doctoral degree, I will have the opportunity to continue my work with chronic pain management during my postdoctoral training, and in my future career as a rehabilitation psychologist. I am proud to bring with me the knowledge gained through my work on this investigation, as well as the high quality of experience that I have gained while working with such fine colleagues.

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Chapter One

Introduction

Pain has been defined by the International Association for the Study of Pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such.” (Merskey, 1986; Merskey & Bogduk, 1994). Pain Disorder is described in the American Psychiatric Association’s DSM-IV-TR (APA, 2000) as a somatoform disorder with the following criteria: 1) pain in one or more anatomical sites is the predominant focus of the clinical presentation, and is of sufficient severity to warrant clinical attention, 2) the pain causes clinically significant distress or impairment in social, occupational, or other important areas of functioning, 3) psychological factors are judged to have an important role in the onset, severity, exacerbation, or maintenance of the pain, 4) the symptom or deficit is not intentionally produced or feigned (as in Factitious Disorder or Malingering), and 5) the pain is not better accounted for by a Mood, Anxiety, or Psychotic Disorder and does not meet criteria for Dyspareunia.

The DSM classification of pain disorder also includes designations for whether psychological factors play a prominent role in the development, onset, exacerbation, or maintenance of pain, or if pain is influenced by both psychological factors and also by a general medical condition. These types of pain (Pain Due to Psychological Factors or Pain Due to Psychological Factors and to a General Medical Condition) are listed as Axis I psychiatric disorders. If a pain condition is judged to be the result of only a general medical condition then it is not considered a psychiatric disorder but is instead identified as a medical disorder and listed on Axis III. Importantly, the DSM also specifies whether

pain is *acute* (pain with duration of less than six months) or *chronic* (pain lasting six months or longer). It is important to understand the nature of both acute and chronic pain as pain classified using each of these categories is likely to have somewhat different etiology, related biological, psychological, and social impact, and most importantly, different response to treatment.

Acute versus Chronic Pain

Though the distinction between acute and chronic pain from the DSM relates primarily to the duration of the pain condition, numerous authors have drawn more qualitative distinctions between these two terms. Such distinctions often include mention of differences in the treatment, experience, and impact of pain on the lives of the pain patient. For example, Caudill (2002) identifies several differences between acute and chronic pain. Specifically acute pain lasts less than 6 months. Examples of acute pain include pain resulting from surgery, injury, or the like. This pain lasts only as long as it should take for a typical individual to recover from surgery or an injury (e.g., broken leg, appendectomy, etc.)

Conversely, chronic pain lasts more than six months. It affects more than one system of the body (e.g., endocrine, respiratory, nervous system, etc). There may or may not be a clearly identified physiological cause. As previously noted, the classification of pain as acute or chronic does carry some important implications for treatment. For example, rest and time are likely to be helpful when pain is acute; however, inactivity may be harmful in terms of management of chronic pain conditions (Caudill, 2002). In addition, physicians can typically “fix” or “cure” injuries that result in acute pain while

there are often no “cures” for chronic pain, and a much more collaborative approach to treatment is typically beneficial for chronic pain patients.

In the aforementioned definitions of acute and chronic pain (e.g., from the DSM-IV), the primary role or association of psychological factors is not a necessary condition for the existence of pain. However, psychological disorders such as Major Depressive Disorder (Banks & Kerns, 1996; Fishbain, Cutler, Rosomoff, et al., 1997; Romano & Turner, 1985), Panic Disorder (Stewart, Breslau, & Keck, 1994), Posttraumatic Stress Disorder (Kulich, Mencher, Bertrand & Maciewicz, 2000), and Social Phobia (Asmundons, Jacobson, Allerdings, & Norton, 1996) are frequently comorbid with chronic pain conditions. Furthermore, problems with anxiety, depression, and other forms of negative affect are likely to be especially prevalent at the time when one is adjusting to the knowledge that they have a chronic pain condition which may significantly impact their life. Psychological symptoms and disorders may also emerge in pain patients over time. For example, frustration and negative or maladaptive beliefs about pain are likely to become more intense and/or frequent the longer one experiences chronic pain. Generally, the longer an individual experiences chronic pain, the more associated problems become integrated in their lives (e.g., Turk, 1996).

The Multidimensional Impact of Chronic Pain Conditions

Chronic pain conditions are highly aversive and debilitating conditions that affect the lives of many people physically, emotionally, and financially. In the United States, prevalence estimates of adults with chronic pain in the general medical population have ranged from 20 to 60% (Clark, 2002; Elliott, Smith, Penny, Smith, & Chambers, 1999; Latham & Davis, 1994). Although these rates appear daunting, they may actually

underestimate pain prevalence. For example, some participants in the aforementioned studies may have been suffering from more than one chronic pain condition while many others (not included in these studies) manage their pain without the medical services from which estimates were derived (Von Korff, Dworkin, LeResche, & Kruger, 1988). Further, Joranson and Lietman (1994) found that chronic pain is reported by one in five adult Americans in the general population (approximately 50 million) during their lifetimes and that 4.9 million people seek treatment for chronic pain each year (Marketdata Enterprises, 1999).

Previous studies of chronic pain in the United States have estimated that approximate annual costs resulting from the treatment, disability, unemployment, compensation, etc. of chronic pain patients are between forty and sixty billion dollars (Aronoff, Evans, & Enders, 1983; Bonica, 1980). More recent estimates of direct and indirect costs associated with pain have been reported to be upwards of 125 billion per year (Turk, Okifuji, Kaluaokalani, 1999). These statistics suggest that the problem of chronic pain places a large financial burden on pain patients, the medical system, and on society in general.

In addition to financial costs, the personal costs to pain patients are extremely high. Individuals who suffer from chronic pain are always aware of their pain and must deal with limitations in concentration, activity level, social and occupational functioning, as well as impairment in other aspects of life (Banks & Kerns, 1996). Chronic pain conditions are often concomitant with other psychiatric diagnoses including depression (Banks & Kerns, 1996; Dworkin & Gitlin, 1991; Fishbain et al., 1997; Sullivan, Reesor, Mikail, et al., 1992) and anxiety (Asmundson et al., 1996). While base rates for

psychological diagnoses vary according to particular pain condition investigated and also with differences in measurement techniques, prevalence rates for the aforementioned psychological disorders have been found to be greater for those with chronic pain conditions than for the general population. While the lifetime prevalence rate for Major Depressive Disorder is approximately 17.1% (Blazer, Kessler, McGonagle, and Swartz, 1994), this disorder appears to be much more common in chronic pain patients. For example, a review by Fishbain, Goldberg, Meagher, Steele, & Rosomoff (1986) found that the majority of studies in their review indicated that over 50% of sampled patients with chronic pain reported clinical depression. In addition, high rates of lifetime prevalence for anxiety disorders have been shown in the literature. One large-scale investigation found that 13% of males and 15 % of females who reported chronic headaches also reported a history of Panic Disorder (Stewart et al., 1994). Another study suggests that between 50 and 100% of individuals presenting at pain treatment centers meet DSM-IV criteria for PTSD (Kulich et al., 2000).

Other psychological disorders and difficulties such as Substance Abuse and Dependence (Dunbar & Katz, 1996), sleep problems (Keith, Eriksson, D'Eon, Mikail, & Emery, 2002), and Borderline Personality Disorder (Polatin, Kinney, Gatchel, Lillo, & Mayer, 1993) have been found to be highly comorbid with certain chronic pain conditions. Moreover, it has been estimated that of the 176,000 chronic pain patients who were treated in pain treatment centers in 1995, the average cost of treatment was \$8,100 per patient (Marketdata Enterprises, 1999).

With such deleterious sequelae, it is clear that effective, affordable treatments are needed for the treatment and management of chronic pain conditions. Current chronic

pain treatments are based on theoretical models of pain etiology and impact. While a complete review of such models is beyond the scope of this paper, it is important to note that conceptualizations of chronic pain have become increasingly complex over the years. Historically, chronic pain has been conceptualized with *biomedical models* of health and illness (e.g., Engel, 1977). These models purport that only biological factors are involved in the etiology of disease, while other factors such as psychological variables (e.g., depression, anxiety, etc.) are thought of as reactions to or byproducts of the biological illness (Turk, 1996). However, research has not consistently demonstrated a direct correlation between injury/tissue damage, and pain or illness (e.g., Waddell & Main, 1984; Deyo, 1986).

More complete conceptualizations of chronic pain incorporate psychological, social, and cultural factors as well as physical/biological variables, and explain how each of these factors interact to cause and/or maintain chronic pain. Such conceptualizations are known as *biopsychosocial models* (e.g., Melzack & Wall, 1965; Cook, Weir, & Tunks, 1989; Melzack, 1999; Dworkin, Von Korff, & LeResche, 1992), are now widely accepted, and have received much more consistent empirical support than purely biological explanations of pain. Biopsychosocial conceptualizations have led to the development of treatment interventions that address numerous factors (e.g., physical injuries or abnormalities, maladaptive thought patterns, maladaptive behaviors, nutrition, negative life changes, limitations in physical, interpersonal, family, or occupational functioning, cultural meaning of pain, etc.), which are believed to play a role in the onset and course of chronic pain conditions.

Treatment for Chronic Pain Conditions

Given the multidimensional experience of pain, as well as the widespread impact pain can have on an individual's life, *multidisciplinary treatment* for chronic pain has become the standard of care. Multidisciplinary treatment of chronic pain typically consists of medical interventions (e.g., medications, injections, surgery) psychological interventions (e.g., group cognitive-behavioral therapy, biofeedback, relaxation, etc.), physical therapy, and regular exercise. Other treatment modalities, including occupational or vocational therapy and nursing, are also frequently employed (Turk & Stacey, 1997). *Multidisciplinary Pain Centers* (MPC; as defined by the IASP Task Force on Guidelines for Desirable Characteristics for Pain Treatment Programs, 1990) are facilities that provide multidisciplinary pain treatment. A recent work noted that there are more than 400 multidisciplinary pain treatment facilities in the United States and another 1,000 across the world (Turk, 2001). Treatment provided within MPC's varies somewhat, but typically include services such as medication management, physical exercise, cognitive and behavioral techniques for pain and stress management, and most often include treatments that assist in the treatment of physical and psychological components of pain (Okifuji et al., 1998).

A meta-analysis of outcome studies involving multidisciplinary treatment centers found that individuals participating in such programs showed substantial improvement in pain intensity, pain behaviors (e.g., wincing, bracing, guarding, etc.), activity level, and use of medical services when compared to untreated controls, or to those who were treated using unimodal treatments (e.g., treated with medicine or physical therapy only; Flor, Fydrich, & Turk, 1992). Other research has also demonstrated empirical support for

MPC's (Cutler, Fishbain, Rosomoff, Abedel-Moty, Khalil & Rosomoff, 1994; Malone, Strube, & Scogin, 1988). Importantly, the methods utilized to evaluate such research investigations have been found to be of good quality (Fishbain, Cutler, Rosomoff, Steele, & Rosomoff, 2000), and this lends support to the findings suggesting that MPC's provide consistently effective treatment. Despite reports that patients in MPCs are not representative of chronic pain patients (e.g., patients who visit MPC's may have more severe pain, higher levels of emotional distress, or have not benefited from other forms of treatment such as surgery; Crook et al, 1989) multidisciplinary treatments for chronic pain have consistently been found to be efficacious and/or effective in research over the last decade.

Furthermore, several reviews have found that multidisciplinary treatments for chronic pain conditions have been found to be more effective than non-multidisciplinary, traditional pain treatments. For example, in a review of the literature, Turk (2001) reported that interdisciplinary pain rehabilitation programs (IPRPs) are effective in decreasing pain, decreasing the use of narcotic pain medications, while simultaneously increasing rates of return to work, activation, and closing disability claims. As described by Turk (2001) IPRPs are a type of treatment offered as part of many MPC treatment programs. IPRPs address pain using the goal of functional restoration (e.g., increasing ability to engage in activities of daily living and facilitating return to work) and improvement of quality of life, and are not primarily geared to significantly reduce or eliminate pain as are treatments such as nerve block treatments or long-term use of opioid medications. IPRPs are multidisciplinary treatments, usually conducted by a group of psychologists, physicians, and physical therapists.

Both clinical and cost-effectiveness of these programs as measured by pain reduction, improvements in functional activities, alleviation of depression, decrease in overall health care consumption, and termination of disability claims have been demonstrated in the literature (Cutler, Fishbain, Rosomoff, et al., 1994; Flor et al., 1992). This review also suggests that IPRPs are more effective than unimodal treatments such as pharmacotherapy or surgery. For example, a review of spinal cord stimulation treatment for patients with low back pain noted complications of treatment in as many as 50% of patients (Turner, Loeser, & Bell, 1995). In contrast, this review reports no iatrogenic consequences of IPRP treatment (Turk, 2001). As suggested by Turk's review, it seems that multidisciplinary pain programs can provide treatment with an emphasis on pain management as opposed to pain cure, and thus, such programs are able to provide benefits to chronic pain patients without exposing these individuals to unnecessarily high risks.

Another review of 10 randomized studies of patients with chronic low back pain (N = 1964) indicated that multidisciplinary biopsychosocial rehabilitation (e.g., physical exercise, psychological treatment and occupational or social interventions were utilized in these trials) treatments resulted in greater improvement in function and greater pain reduction than did non-multidisciplinary treatments as measured by effect size (Guzman, Esmail, Karjalainen, Malmivaara, Irvin, & Bombardier, 2001). Importantly, studies were selected and evaluated for Guzman and colleagues' review using stringent criteria. For example, study selection criteria as well as evaluation of the methodological quality and clinical relevance of the studies utilized in this review were coded by two independent reviewers. For inclusion in this review studies had to meet a number of criteria. The

reviewers required that for each study to be included in the review 1) study investigators must have utilized samples of individuals who had experienced disabling low back pain for at least three months, 2) that one group of participants (from each investigation) received a multidisciplinary treatment that was well-defined (e.g., by a treatment protocol), 3) each study must have utilized a control condition which was not equivalent to the review's criteria for a "multidisciplinary biopsychosocial rehabilitation" program, and 4) each investigation was required to report treatment outcome in at least one domain such as pain severity, global improvement, functional status, quality of life, or employment status (Guzman et al., 2001). The conservative approach used throughout this review adds strength to the growing body of literature related to the effectiveness and efficacy of multidisciplinary biopsychosocial pain treatments.

It is notable that multidisciplinary treatments for chronic pain have demonstrated greater efficacy when compared to unimodal treatments such as physical therapy/exercise (Nelson, O'Reilly, Miller, et al., 1995), medication management (Clark, 2000; Warme, Turner, Marshak & Cardenas, 2002), as well as individual cognitive behavioral or behavioral therapies (see review by Morley, Eccleston, & Williams, 1999), and group cognitive behavioral psychotherapy (Frettlech & Kroener-Herwig, 1999; Keefe, Beaupre, Gil, et al., 2002). Such results have been demonstrated for patients with a wide variety of chronic pain conditions (see review by Morley, Eccleston, & Williams, 1999).

In addition to greater pain reduction and decreased health care utilization, multidisciplinary pain treatments have also been shown to result in improvements to psychosocial difficulties associated with chronic pain (e.g., Flavell, Carrafa, Thomas, & Disler, 1996; Bendix, Bendix, Lund, Kirbak, & Ostenfeld, 1997; Becker, Sjogren, Bech,

Olsen, & Eriksen, 2000). A recent investigation demonstrated that interdisciplinary approaches to chronic pain treatment resulted in improvements in psychosocial variables including depression and self-efficacy as well as in physical variables such as range of motion, muscular strength, muscular endurance, and cardiovascular endurance in a heterogeneous sample of chronic pain patients (Mills, 2002).

Further, support for multidisciplinary pain treatment above general primary care treatment comes from a recent randomized controlled trial of treatment outcomes of 189 patients diagnosed with chronic non-malignant pain (Becker, Sjogren, Beck, Olsen, & Eriksen, 2000). Patients were randomly assigned to one of three conditions including 1) multidisciplinary pain treatment in a Danish MPC, 2) treatment by a general practice physician who received a pain management plan by a pain management specialist, or 3) were assigned to a wait-list control condition. Findings from this investigation indicated that after six months of treatment individuals in the MPC condition experienced a statistically significant reduction in pain intensity, improvement in psychological well-being, and improvement in quality of sleep and physical functioning. No improvements on any of these measures were found for the group treated by GPs. Although results indicated that there were significant reductions in patient usage of short acting opioid medications in both the MPC and GP groups, reduction of narcotic pain medications “on demand” was found for the MPC group only. Patients in the wait-list control group did not improve on any study measures, and actually evidenced worse scores on measures of general psychological well-being, anxiety, and depression. The authors concluded that the MPC group treatment was superior to the control condition in terms of improving pain intensity ratings and quality of life. Perhaps more importantly, these authors state

that the establishment of diagnosis with a pain condition and provision of a treatment plan by a pain specialist would not enable referring GP's to successfully manage severely chronic pain patients (Becker et al., 2000). This finding highlights the use of multidisciplinary modalities (and providers) in the treatment of chronic pain rather than relying solely on primary care providers to manage their patients' pain conditions.

Cost Effectiveness of Multidisciplinary Pain Treatments

The reviews and investigations described above support the usefulness of multidisciplinary interventions with chronic pain populations using a broad array of criteria; however, it is also important that multidisciplinary chronic pain treatments are both available and accessible to those who would benefit from them. Even if pain patients and providers recognize that pain treatments are likely to decrease pain and increase quality of life, the treatments would not be utilized if they were not affordable or cost effective. Thus, it is important to show that multidisciplinary pain treatments are cost effective. Romano and Turner (1984) highlight this point by incorporating cost effectiveness into a conceptualization of the components of good chronic pain treatments.

Specifically, Romano and Turner outline three characteristics of "effective treatments". According to these authors, an important criterion for an effective treatment is that the treatment is *preventive*. As chronic pain is typically resistant to treatment, intervening at an earlier point when symptoms are more manageable may increase the utility of treatments. In addition, Romano and Turner suggest that only *empirically validated* treatments be utilized when symptoms are severe. A third criteria for effective treatments proposed in this model is that treatments are *affordable for the patient and health care provider*. Applied to a multidisciplinary pain treatment program, Romano

and Turner's criteria would be likely to ensure a high quality of care that is accessible to chronic pain patients.

Although intensive multidisciplinary treatments for chronic pain are typically utilized after individuals have been diagnosed with chronic pain conditions (e.g., such treatments are not preventive per se), multidisciplinary treatments, such as those reviewed above, have received a great deal of empirical support, and have also been found to be quite cost effective. There has been a trend in the literature toward evaluation of the cost-effectiveness of multidisciplinary pain treatment for chronic pain (Okifuji et al., 1998; Turk, 1996). Numerous investigations have demonstrated that multidisciplinary pain treatments are cost-effective when compared to other forms of treatment (Simmons, Avant, Demski, & Parish, 1988; Turk, 2001) and when compared to no-treatment controls (Cassisi, Sybert, Salamon, & Kapel, 1989).

In recent years there have been some critiques regarding investigations of cost-effectiveness in multidisciplinary chronic pain treatments, which focus on study methodology. For example, some researchers have noted that many studies of cost effectiveness of multidisciplinary chronic pain treatments are based on ill-defined outcome criteria (Thomsen, Sorensen, Sjogren, Eriksen, & Jorgen, 2001). However, despite such criticism, it appears that there is adequate empirical support for cost-effectiveness of integrative pain treatments in the literature. For example, a recent investigation compared the relative cost-effectiveness of three treatments (each lasting three months) including 1) psychological (cognitive-behavioral) treatment plus pharmacotherapy, 2) pharmacotherapy alone, and 3) no treatment from a pain center

(standard care) in the treatment of a heterogeneous group of chronic pain patients referred to an MPC in Dallas, Texas (Cipher, Fernandez, & Clifford, 2001).

In contrast to critiques noted above, this investigation utilized clear, extensive outcome criteria. This study measured outcome variables such as cost of treatments (defined by the number of pain-related visits to any healthcare professional two months prior to each assessment and the estimated cost of these visits via self-report and medical records), employment status, disability status, pain severity, and depression levels. Outcome domains related to employment, disability, pain, and depression were measured by participants' scores on the Health Status Questionnaire (Health Outcomes Institute, 1993) or on the Multidimensional Pain Questionnaire (MPQ; Kerns, Turk, & Rudy).

Investigators took measures of all study variables from all participants one week prior to treatment, and then again at five, seven, nine, eleven, and thirteen months following the start of treatment. At each follow-up assessment participants were asked to provide information in all outcome domains for the period of the past two months. It was demonstrated that patients in the multidisciplinary group (psychology plus pharmacotherapy) improved the most in terms of functional capacity and posttreatment healthcare utilization (e.g., participants in the multidisciplinary treatment condition attended an average of 23.9 health care visits, while those in the pharmacotherapy only condition attended an average of 45.9 visits). It also found that the combined treatment was the most cost-effective. For example, Cipher and colleagues found that average posttreatment healthcare costs (money spent for healthcare in the 10 months following the study) for patients who had participated in the combined pharmacotherapy and cognitive-behavioral therapy condition were \$2,695.12, while average costs for those in

the pharmacotherapy only treatment were \$6,281.18. Average costs for those in the no treatment control group were similar to those in the combined treatment (\$2,328.58); however, these participants did not show any functional improvement. Interestingly, the results of this investigation highlight the role of the psychologist in treating chronic pain. Findings indicated that individuals who received cognitive-behavioral therapy (provided by a psychologist) evidenced significantly greater improvements in functional capacity from pre to posttreatment, and that healthcare costs were three times greater during a ten-month follow-up period for patients who did not receive this type of intervention.

It is clear that this investigation lends support to the body of literature regarding the cost-effectiveness of multidisciplinary pain management interventions; however, the treatment groups in this investigation did not specifically involve all of the components typically included in MPC treatments and associated research (e.g., physical therapy, nursing, occupational therapy were not intentionally included in any of the study conditions). This occurrence may suggest that less intensive interdisciplinary pain treatments may be clinically beneficial and also quite cost effective.

“Light” Multidisciplinary Treatment for Chronic Pain

As noted above, both unimodal and multidisciplinary treatments have been shown to be helpful for individuals with chronic pain, and that multidisciplinary treatments typically result in better outcome (compared to traditional treatments). The cost effectiveness of multidisciplinary treatments for chronic pain has also been demonstrated. Interestingly, several investigations have also shown empirical support for the efficacy or effectiveness of less intensive (“light”) forms of interdisciplinary/integrative treatment for chronic pain (e.g., Talo, Forssell, Heikkonen, & Puukka, 2001). For example,

Soederlund & Lindberg tested the effectiveness of a light interdisciplinary treatment for individuals with chronic whiplash associated disorders, comprised of integrated cognitive-behavioral and physiotherapy. Their treatment would be considered “light” because it did not include medication management, nursing interventions, or other treatment modalities such as occupational therapy or social work. Investigators found that this treatment decreased patient’s pain intensity ratings in the context of engagement in problematic daily activities (Soederlund & Lindberg, 2001). Also, findings demonstrated that patients’ movements and behaviors changed during the course of the study. These participants’ movements became more ergonomically sound in daily activities (those limited by pain) that occurred outside of treatment (as measured by self-report measures of pain disability, coping, and self-efficacy). Importantly, this investigation showed that using psychological techniques (functional behavioral analyses of specific patient difficulties) could be helpful when used as part of assessment and treatment planning for physiotherapy.

Another investigation of less intensive interdisciplinary chronic pain treatment examined the effects of CBT and medical care in a sample of German low back pain patients (Basler, Jakle, & Kroner-Herwig, 1997). This study demonstrated that CBT plus medical care resulted in less self-reported pain, better control over pain, increase in reported pleasurable feelings and activities, less avoidance and catastrophizing. Additionally, participants who received CBT and medical care demonstrated less disability as measured by increased social roles, increased physical functioning, and increased cognitive performance when compared to reports of patients who received only medical care.

Although efficacy of less comprehensive, interdisciplinary pain treatments has not been shown to have superior outcomes relative to traditional multidisciplinary treatments, (e.g., treatment provided within MPCs), it is possible that certain combinations of pain treatments may be able to address a broad array of patient difficulties while avoiding unnecessary and expensive components of treatment. As previously noted, careful assessment and treatment planning are important to develop appropriate treatment strategies for individual chronic pain patients (Soederlund & Lindberg, 2001). Such assessments and treatment planning could provide information that would allow providers to develop programs that address very specific needs and deficits of individual patients or similar groups of patients. A program that is carefully tailored to a patient's needs and preferences may be more beneficial than "under-treating" (e.g., only providing medication management when this treatment does not appear to be resulting in increased functioning) or "over-treating" the patient ("e.g., providing treatments that are not necessary solely because they are part of multidisciplinary treatment center protocol such as incorporating occupational treatment when a patient is retired).

This is not to imply that all components of multidisciplinary treatment for chronic pain are not important, that treatments should be withheld for the purpose of saving money, or that patient needs are not assessed prior to multidisciplinary treatment. Rather, the idea here is that multidisciplinary treatment for chronic pain patients can be further refined by increasing the fit of treatment to the individual needs of the patient. A study by Haldorsen and colleagues (2002) illustrates this idea and provides preliminary evidence for the use of "light" multidisciplinary treatments for patients with chronic musculoskeletal pain. This study compares the effectiveness of ordinary, light, and

intensive multidisciplinary pain treatments with 654 individuals classified with good, medium or poor prognosis using an outcome criteria of return to work.

In this investigation, level of prognosis (good, medium, or poor) was estimated prior to treatment using a questionnaire and interview provided by a psychologist (Haldorsen, Kronholm, Skouen, & Ursin, 1998), and also by a standardized physiotherapy evaluation consisting of the Global Physiotherapeutic Examination (Sundvold, Vaglum, & Denstad, 1982), measurement of tender points (Wolfe, Smythe, Yunus, Bennet, Bombardier, et al., 1990), The Sock Test (Strand and Wie, 1999), and by a lifting test (progressive isoinertial evaluation; PILE; Mayer, Gatchel, Barnes, Mayer, & Mooney, 1990). Results indicated that participants with good prognosis fared equally well in each treatment, participants with medium prognosis did equally well in both light and multidisciplinary treatment conditions, while those with poor prognosis received the most benefit from more intensive conditions. There were positive cost benefits found for both light as well as more intensive multidisciplinary treatments. Overall, the results from this project appear to suggest that different treatments may be more or less effective for different individuals, and seem to lend support for the use of less intensive but integrative treatments when they are appropriate to patient condition.

Taking these findings into consideration, it seems possible that integrated yet less intensive treatments may prove beneficial for chronic pain patients when applied following careful screening for patient deficits and needs. As these forms of treatment require fewer services, they are likely to increase cost effectiveness while not sacrificing quality of care; however, even the best treatment plan may be ineffective if the suggested

treatments do not address barriers that could stop patients from engaging in treatment activities.

Barriers to Patient Improvement in Multidisciplinary Treatment

It has been suggested that noncompliance with aspects of treatment can detract from treatment outcome and can also decrease cost effectiveness of multidisciplinary treatments (Masur, 1981). Multidisciplinary treatments are thought to be effective in large part due to the simultaneous application of multiple unimodal treatments (which address all aspects of chronic pain) each of which theoretically enhances benefits of other treatment being provided. In short, the interaction of all treatment modes enhances the treatment effect of each alone.

For example, a patient was recently diagnosed with chronic low back pain. He can no longer work as a fisherman, is experiencing difficulty with his marriage and interpersonal relationships, and is starting to feel quite depressed. Referrals from his primary care physician include cognitive-behavioral group therapy, medication management, physical therapy, and occupational therapy; however, the veteran decides to use medications and physical therapy only. Within a few months he starts to notice that his depression is lifting, his pain has decreased, and that he can move a bit better, enough to function adequately in his former job. He decides to return to work. Unfortunately, the patient does not use special lifting techniques (which he could have learned in occupational therapy) and as a result, strains his back on his first day back at work. He is forced to take two weeks off, and during this time starts to experience maladaptive thoughts regarding himself and his future, but has not learned skills to cope with such thoughts (he would have learned these techniques in CBT group). The patient becomes

severely depressed, starts perceiving much higher levels of pain, discontinues physical therapy, and decides to file for disability instead of returning to work again. With this in mind, refusal to participate in an aspect of treatment may decrease benefits gained from other components (Vanecek, 2000). Accordingly, if a patient participates in all aspects of a treatment program, but does not engage fully, it is probable that treatment outcome may also be affected negatively.

Dropout, non-compliance, and mixed findings regarding the efficacy and effectiveness of multidisciplinary pain treatment programs may be due in part to the impact of psychological factors, which serve as barriers to treatment. As the number of variables that represent barriers to an individual's response to pain treatment is likely to be infinite, this review will focus on only a few factors that have been shown to be highly correlated with chronic pain conditions, and those that have been found to be predictive of poorer treatment prognosis. Specifically, this investigation will examine psychological factors including 1) pain related anxiety, 2) kinesiophobia, and 3) depression.

As previously noted, conditions including anxiety and depression are highly comorbid with chronic pain conditions. Research conducted within the last decade has examined particular types of anxiety and depression, and how these variables may be related to treatment outcome. Methods of improving extant multidisciplinary treatments (e.g., to enhance the ability of treatments to effectively address barriers to full participation) will be discussed later.

Factors Related to Engagement in Aspects of Multidisciplinary Pain Treatment

Pain Related Anxiety

The role of anxiety in the prediction of chronic pain and in the response to chronic pain treatment has been investigated in numerous studies. High levels of anxiety have been found to be related to higher levels of pain expectation and reduced range of motion, and to prolong the pain experience (McCracken, Gros, Sorg, & Edmands, 1993; Craig, 1994). More recently, McCracken and colleagues have found that physiological symptoms of pain related anxiety were strongly predictive of physical complaints in chronic pain patients (McCracken, Faber, & Janeck, 1998).

Hakjstavroplulos and LaChapelle (2000) reported that low back pain patients in their investigation experienced anxiety levels during physical examinations (as measured by the Beck Anxiety Inventory) that resembled scores of patients that had been diagnosed with panic disorder. These researchers strongly recommend that physiotherapists and other health providers are acutely aware of this anxiety because a patient's anxiety during examination could bias a provider's assessment of patient functioning (e.g., patients tend to report increased somatic sensations, catastrophic thoughts, and pain behaviors upon examination).

The role of anxiety could extend to influence patients' behavior and functioning in other situations where they may be physically tested or evaluated. Indeed, research has demonstrated that anxiety and fear are related to the willingness of patients to fully engage in physical activities and physical therapy as part of their multidisciplinary treatment for pain (Asmundson & Taylor, 1996; Murphy, Lindsay, & DeWilliams, 1999; Burns, Mullen, Higdon, Wei, & Lansky, 2000; McCracken, et al., 1993). For example,

Burns and colleagues conducted an investigation of patients with chronic musculoskeletal pain. They found that pain anxiety decreased participants' ability to carry weights during exercise components of treatment. Importantly, this finding remained even when depression, trait anxiety, and pain severity were controlled. Accordingly, it appears that levels of anxiety and pain related anxiety might impact response to pain treatment.

It has been proposed that the relationship between anxiety and avoidance of activity in pain patients may be due to heightened anxiety sensitivity among chronic pain patients (Asmundson & Norton, 1995; Asmundson & Taylor, 1996; Asmundson, Norton, & Norton, 1999). Individuals with higher levels of anxiety sensitivity tend to attribute catastrophic meaning to their symptoms of anxiety, and may therefore fear and avoid stimuli or situations that they believe are related to physical sensations of anxiety (Greenberg & Burns, 2003). A recent investigation of 70 chronic musculoskeletal pain patients demonstrated that anxiety sensitivity does function as a barrier to physical activity for some chronic pain patients (Greenberg & Burns, 2003).

Fortunately, if pain related anxiety and subsequent avoidance behavior are related to individuals' beliefs, components of multidisciplinary treatment such as cognitive-behavioral treatment and physical therapy/exercise would be helpful. For example, a combination of cognitive-behavioral treatment and exercise would assist clients to recognize and alter maladaptive thoughts while they are engaging in the feared physical activity (e.g., the physical therapy program). Such treatments could address thoughts that are related to avoidance behavior and thus, provide pain patients the opportunity to gather evidence (from their behavior during exercise) that can be utilized to falsify maladaptive beliefs (e.g., that activity would lead solely to negative outcomes). Treatment including

CBT and PT could also provide positive experiences (e.g., experiencing positive physical sensations while exercising), which would assist chronic pain patients to re-evaluate their beliefs about activity, and hopefully, decrease the impact of pain related anxiety or anxiety sensitivity as barriers to treatment. Preliminary evidence regarding the role of anxiety sensitivity is promising but there is also research to support conceptualizations that anxiety related to pain is more like a specific phobia. There has been a great deal of attention given to this conceptualization in recent research related to Kinesiophobia (Vlaeyen, Kole-Snijders, Boeren, et al., 1995).

Kinesiophobia

Kinesiophobia is defined as the fear of (re)injury. This construct that is related to pain-related anxiety; however, as recent research indicates, the fear of (re)injury is likely to play an important role in the prediction of treatment response independent of overall levels of anxiety (Vlaeyen et al., 1995). Using a measure of kinesiophobia, Vlaeyen and colleagues (1995) demonstrated that fear of movement or (re)injury was a better predictor of self-reported disability than were biological markers of pain severity (e.g., tissue damage). Similarly, another study revealed that measures of pain-related fear including kinesiophobia were superior to self-reported pain measures in predicting self-reported disability and poor behavioral performance (Crombez, Vlaeyen, Heuts, & Lysens, 1999). Given that a multidisciplinary pain management program should include some form of physical therapy, exercise, stretching, or yoga, an unwillingness (or perceived inability) to engage in such treatment modalities due to kinesiophobia is likely to negatively impact one's level of treatment compliance and treatment outcome.

One recent investigation examined whether graded exposure in-vivo would assist chronic pain patients to overcome their fears of activity or re-injury (Vlaeyen, de Jong, Geilen, Heuts, & van Breukelen, 2001). Vlaeyen and colleagues (2001) utilized a single-case cross-over design to test the effects of a treatment, which utilized graded exposure in-vivo treatment with behavioral experiments in one condition versus graded activity treatment in the other condition. Four chronic low back pain patients reporting kinesiophobia were included in the study. Half of the patients were assigned to each condition and measures of pain-related fears and cognitions were recorded each day for a period of sixty-three days using a visual analog scale. Measures of pain-related fear, pain catastrophizing, pain control, and pain disability were taken pre and post treatment for all participants.

Prior to treatment all patients and their therapists developed a hierarchy of feared movements associated with a series of photographs of 98 activities of daily living. In the experimental condition, patients were educated about management of their pain and provided with explanations of how pain beliefs, fears, avoidance behavior, disability, and pain are interrelated and involved in the maintenance of their chronic pain. Subsequently, tasks were developed for each individual based on their fear hierarchy. Each task was modeled by the therapist, and then the patient was asked to engage in the activity until anxiety decreased. Maladaptive cognitions were challenged by the therapist during the participant's engagement in each task. This procedure was used until termination, when participants were encouraged to continue to utilize these techniques in their daily lives. While in the graded activity phase of the study, baseline activity levels of activity were recorded for participants. Activity quotas were determined, and participants were

expected to engage in these activities for a certain amount of time using a standard circuit of exercise equipment. Any activities that reflected a rating of above 50 on the fear hierarchy were not included in participants exercise regimen (without participant knowledge) to avoid crossover between this and the experimental treatments.

Findings revealed that improvements in participants' pain-related fears and cognitions occurred only during the graded exposure in-vivo treatment regardless of treatment order. Additionally, it appears that pain-related fears coincided with decreases in pain catastrophizing, pain disability, and for half of the cases, with increases in pain control. Despite the small sample size, this study demonstrates the increased effectiveness of particular psychological treatments when they are used in vivo.

Behavioral treatments are commonly utilized as part of multidisciplinary pain treatment and thus, it is probable that increasing the applied nature of such treatments (e.g., modeling psychological techniques during physical therapy treatment), as demonstrated by Vlaeyen and colleagues' investigation, would enhance treatment benefits and allow participants to engage in treatment despite pain related fears.

Depression

The literature on depression and chronic pain indicates a high rate of comorbidity (Fishbain et al., 1997; Banks & Kerns, 1996; Williams, 1998; Romano & Turner, 1985). Prevalence rates of depressive and chronic pain symptoms between 31 - 100% have been cited (Fishbain et al., 1997), with variation in prevalence due to differences in assessment methods (e.g., point versus lifetime prevalence) as well as inconsistency of criteria (e.g., whether DSM criteria was utilized to define cases, whether "depression". As previously noted, depression rates in chronic pain patients have also been found to be much higher

than rates in the general population of the United States National Comorbidity study (Blazer, Kessler, McGonagle, & Swartz, 1994).

Banks and Kerns (1996) have identified four different aspects of the chronic pain experience that may account for higher rates of depression within this population. These researchers explain high rates of comorbidity in terms of pain symptoms, primary and secondary losses resulting from living with chronic pain, and the impact of the medical system. They propose that the experience of chronic pain is a more powerful stressor than other chronic illnesses, including maladies comprised of symptoms, which overlap with chronic pain symptomatology. Chronic pain is discussed as more aversive and demanding than acute pain conditions. Losses (e.g., the inability to maintain marital relationships, loss of a job, feelings loss of integrity, control, vitality, self-esteem, or family role) resulting from chronic pain are thought to be the result of physical impairment or disability. Such losses can also be related to factors such as reduced psychosocial functioning (e.g., limitations in daily routine, and decreased occupational, recreational, social, and sexual functioning. According to the authors, some pain related disability is the result of learning. Specifically, Banks and Kerns (1996) indicate that the development of disability can begin when activities that cause or associated with pain are gradually extinguished due to the perception that pain is a consequence of activity. Further, such decrease in activities typically results in physical deconditioning, which leads to further decreased activity, and a subsequent increase in pain. Importantly, this cycle is also likely to result in increased depressive symptoms. This process is similar to learning models of depression formulated by Lewinsohn and colleagues (1981) as well as to more cognitive-behavioral theories of depression (e.g., Abramson, Seligman, & Teasdale,

1978; Abramson, Metalsky, & Alloy, 1989) which incorporate individual attributions as a causal component of depression.

Banks and Kerns (1996) have formulated a diathesis-stress framework to explain the development of depression in chronic pain patients. Similar to earlier vulnerability models, this model uses cognitive mediating variables (e.g., negative views of the self, the world, and the future and internal, stable, and global attributional style) described by Beck (1967, 1976) and Abramson (1989) in the role of diathesis. However, it also addresses questions about the higher rates of depression in chronic pain patients by including stressors specific to the unique aspects of the chronic pain experience. Indeed, it is likely that since both pain and depression are related to reduced motivation, increased fatigue, and decreased activity levels, comorbid depression and chronic pain may result in avoidance of or decreased participation in treatment. Thus, patients with both conditions could be faced with barriers to participation in treatment resulting directly from the symptoms of their disorders and related experiences.

One experience that is commonly reported among those with chronic pain conditions, and is theoretically related to the development of depression in chronic pain patients, is chronic pain patients' experiences within the medical system. According to Banks and Kerns (1996) an important problem for chronic pain patients is that their perception of their own pain and limitations may not match physician assessments of their physical condition. For example, a rheumatoid arthritic may feel a great deal of pain and believe that they can not type at work even when their doctor tells them that their joints do not show a great deal of inflammation.

At times, patients' perceptions are not validated by physician examinations. In this situation the patient is left thinking that there is something wrong with them because they are feeling pain when their doctor tells them they should not be experiencing symptoms. In a report by Goldman (1991), this type of disagreement between patient and physician can lead to self-doubt, distrust of the physician, confusion, frustration, and affective distress and does not usually occur between physicians and patients with other chronic illnesses (Goldman, 1991; as cited by Banks and Kerns, 1996). In sum, exposure to these particular negative experiences in the healthcare setting to create a negative mindset in the chronic pain patient with which other medical patients do not have to contend. According to Banks and Kerns (1996), invalidation in the medical system can act as a stressor (in diathesis-stress models) for pain patients that can lead to depression and increased perception of pain.

Several investigations in the literature that have examined the difference between patient and physician ratings of pain have found that physicians do underestimate patient's pain levels (Hodgkins, Albert, & Daltroy, 1985; Todd, Lee, & Hoffman, 1994; Thomas, Borczuk, Schakelford, Ostrander, Silver, et al., 1999; Marquie, Raufaste, Lauque, Marine, Ecoiffier, & Sorum, 2003). For example, Marquie and colleagues (2003) studied 200 individuals presenting with pain in the emergency room of a French hospital. Both patient ratings of their pain (taken by study investigators with a visual analog scale) and physicians' assessment of patients' pain levels (as measured by physicians' ratings on a visual analog scale after seeing VAS ratings taken by a triage nurse prior to the evaluation) were taken during the initial evaluation and when each patient left the hospital. Authors reported interactions between the level of miscalibration

and 1) level of physician experience, 2) gender of patients, 3) gender of physicians, and 4) the obviousness of the cause of pain. However, study findings demonstrated that physicians tend to “miscalibrate” (via underestimation) patient pain ratings taken at intake and just prior to discharge.

The mismatch between providers views of chronic pain patients pain experience may result in a decreased likelihood of a referral for pain treatment, and can thus be viewed as a barrier to pain treatment; however, it is also likely that chronic pain patients, especially those who have comorbid depression may experience a decrease in desire to enter into or engage fully in treatments for their pain as a result of their symptoms and as a result of invalidation (e.g., because of a decreased trust in providers who they find to be invalidating). Fortunately, psychological interventions, physical therapy, and other components of multidisciplinary treatments for chronic pain address barriers to treatment, such as communication with health providers and coping with difficulties within the medical system (e.g., feeling invalidated by physicians), and provide patients with the opportunity to increase physical, interpersonal, and occupational functioning, and decrease affective distress. Optimally, treatment of barriers to full or partial participation in treatment interventions would occur as early as possible (e.g., as soon as a chronic pain condition was diagnosed), and if possible in a preventive fashion (e.g., using education about treatment barriers prior to entry into treatment); however, it is likely that pain patients could benefit from interventions to reduce barriers at any stage of their treatment (e.g., by reducing the impact of barriers on future treatment compliance and outcome).

The Current Investigation

As previously noted, two central components of the multidisciplinary treatment of chronic pain are group cognitive-behavioral psychotherapy and physical therapy/exercise. In a recent study, Burns and colleagues (1998) found that cognitive-behavioral and exercise interventions may provide unique contributions within multidisciplinary treatment. While each of these modalities addresses and reinforces the other during the course of treatment, current treatment models find physical therapists and psychologists working relatively independently.

Harding and Williams (1995) outline cognitive and behavioral strategies that are used by psychologists in the treatment of chronic pain patients (e.g., cognitive restructuring, relaxation techniques, generalization and maintenance of adaptive coping skills, and relapse prevention), and also explain how physiotherapists can apply these strategies by extending their own skills. Specifically, it is suggested that physiotherapists (who are part of an interdisciplinary team), utilize psychological principles and techniques such as reinforcement and shaping (to move toward increased physical functioning and to decrease pain behavior), education regarding explanations for their pain (physical and psychosocial), setting goals and learning to utilize pacing, challenging thoughts and feelings that may interfere with physiotherapy goals and mood (e.g., by addressing fears that may prevent engagement in treatment, by challenging unrealistic estimates of physical capacity and risk of harm), and by promoting patients' self-attributions about treatment gains and maintenance of these gains (as opposed to allowing patients to credit providers with their improvements).

The ideas presented in Harding and Williams' paper introduce an innovative way to improve physiotherapy and psychological interventions, and in turn, multidisciplinary chronic pain treatment for chronic pain patients. They emphasize the differences between physiotherapeutic techniques that are used for acute and chronic pain, the notion that treatment does not imply a "cure", the need for physiotherapists who treat chronic pain to be experienced and a part of a multidisciplinary team, that other components of multidisciplinary treatment be in place (e.g., psychology and medication management), and that treatment for chronic pain patients must involve both learning and practical, applied experience to be effective. Importantly, methods of preventing the problem of patient invalidation such as by listening to the patient, designing treatment goals in a collaborative fashion, and encouraging patients to take credit for their improvements made during treatment are emphasized.

However, as noted above, the authors imply that physiotherapists apply cognitive and behavioral psychological techniques by extending the skills with which they have been trained. According to these authors physiotherapists could "help patients to capture and challenge unhelpful cognition when they are confronted with feared situations such as physical activity", and can do so using realistic estimates of physical functioning and probability of harm that could result from engaging in activity. While physiotherapists are certainly trained to estimate patients' physical capacity, they are not specifically trained to identify maladaptive cognitions (especially those not related to physical functioning), or to know how and when to challenge such cognitions in the same way that psychologists who practice cognitive-behavioral treatments are trained. Also, physical therapists may be unprepared to handle issues that may occur in the context of applying

psychological techniques (e.g., suicidal ideation). Although physiotherapists may receive some training in behavioral techniques such as shaping and reinforcement, they are only trained to utilize these techniques in specific contexts (e.g., praising a client for lifting a certain amount of weight). Physiotherapists are not trained to utilize these techniques in other areas (e.g., using shaping to help clients to overcome their fears of re-injury).

It may be ineffective to have a physiotherapist using psychotherapeutic techniques, and could certainly present liability issues. An alternative approach may be to utilize the strengths of both psychologists and physical therapists in a more collaborative way. One that would have the potential to bring the benefits of cognitive and behavioral approaches to the physical therapy setting and also to apply the knowledge and experience of physical therapists to the psychological treatment setting.

The novel approach to treatment of chronic pain utilized in this study strives to further integrate the roles of the physical therapist and psychologist. This was done by extending the role of the psychologist into the exercise room (e.g., the psychologist who was leading group therapy was present during exercise sessions, and provided assistance with the application of skills learned in this group), and also by extending the role of the physical therapist to the psychotherapy room (e.g., the physical therapist was present in a group psychotherapy session, provided education and support around exercising with pain, soreness when exercising, and assisted patients to learn accurate interpretations of physical sensations during exercise).

Such integration may be especially important, as it would allow practitioners to directly address specific barriers to successful management of chronic pain such as pain related anxiety (Asmundson & Taylor, 1996), and fear of reinjury (Kinesiophobia;

Vlaeyen et al., 1995; Vlaeyen et al., 1999). It is also likely that the proposed intervention will assist patients in coping with depression, a factor that may lead pain patients to terminate therapy prematurely (Kerns & Haythornthwaite, 1988). Targeting both pain related anxiety and depression is especially important, as both factors have been related to the perception of pain (Geisser, Robinson, Keefe, & Weiner, 1994; Robinson & Riley, 1999).

In addition, increased collaboration of psychologists and physical therapists via extending their roles to respective settings could allow both professionals to address barriers “in vivo”. This type of exposure would help to ensure that non-compliance with treatment or decreased engagement with treatment activities is not due to a failure to generalize skills from one form of treatment to the other. That is, patients should be able to utilize deep breathing skills to address anxiety that may prevent them from engaging fully in exercise, but may not be able to do so without coaching while they participate in exercise activities. Importantly, extending psychologists’ and physiotherapists’ roles to respective settings would be likely to increase patients quality of care, decrease the impact of barriers to treatment, and avoid aforementioned problems of asking practitioners to practice outside of their area of competence.

The multidisciplinary pain management program utilized in this investigation consisted of two components: 1) group psychotherapy/psychoeducation and 2) group physical therapy/exercise. Traditional multidisciplinary chronic pain treatment (e.g., treatment that consists of both components without provider crossover) was compared with a novel approach, with includes traditional treatment plus increased collaboration of physical therapists and psychologists (as described above). The following section

specifies predictions regarding both conditions across a range of physical and psychological assessment measures.

Hypotheses

Hypothesis One – Overall Improvements

As previously noted, chronic pain conditions are related to psychological variables such as anxiety and depression, to one's perception of pain, disability related to pain, and experience with pain in general, as well as to physical strength. As noted, investigations have consistently demonstrated that multidisciplinary pain programs that include components such as psychological interventions and exercise decrease self-reports of depression, anxiety, pain perception, and increase physical strength. The following hypotheses are based on these findings:

1.A. It is predicted that all participants will experience a significant decrease in self-reported pain intensity.

1.B. It is predicted that all participants will experience a significant decrease in self-reported pain disability.

1.C. It is predicted that all participants will experience a significant decrease in self-reported pain-related anxiety.

1.D. It is predicted that all participants will experience a significant decrease in self-reports of kinesiophobia.

1.E. It is predicted that all participants will experience a significant decrease in self-reported depressive symptomatology.

1.F. It is predicted that all participants will experience a significant increase in muscular strength.

Hypothesis Two – Relative Effectiveness of Treatment Conditions in Addressing Psychological Factors, Physical Factors, and Pain Perception and Pain Disability

Traditional multidisciplinary treatment of chronic pain has been shown to be effective in the reduction of psychological factors related to pain as well as in reducing individuals' perceived pain intensity in chronic pain populations. However, many individuals with chronic pain conditions continue to report some pain related anxiety, kinesiophobia, depression, and pain despite positive pain treatment outcome. Thus, it is probable that multidisciplinary treatments with enhanced focus on these factors (e.g., treatments that include increased practice in applying strategies to cope with anxiety and depression in situations where these factors are likely to have a negative impact (such as in participant's exercise sessions) would result in even better outcome when compared with traditional multidisciplinary treatment (treatment as usual). With this in mind, the first part of hypothesis two includes the following predictions:

2.A. It is predicted that there will be a significantly greater decrease in levels of self-reported pain intensity reported by participants in the experimental condition (e.g., those who receive treatment as usual plus modifications to traditional multidisciplinary pain treatment) when compared with control condition participants (those receiving treatment as usual).

2.B. It is predicted that there will be a significantly greater decrease in levels of pain related disability reported by participants in the experimental condition when compared with control condition participants.

2.C. It is predicted that there will be a significantly greater decrease in levels of pain-related anxiety reported by participants in the experimental condition when compared with control condition participants.

2.D. It is predicted that there will be a significantly greater decrease in levels of kinesiophobia reported by participants in the experimental condition when compared with control condition participants.

2.E. It is predicted that there will be a significantly greater decrease in levels of depressive symptoms reported by participants in the experimental condition when compared with control condition participants.

In addition to exacerbating self-reported perception of pain, anxiety and depression are thought to act as barriers to treatment response (e.g., pain-related anxiety, kinesiophobia, and depression may prevent full engagement in components of treatment such as physical therapy and exercise) and thus, the overall benefits/effectiveness of multidisciplinary treatment may be decreased.

The extension of the role of the psychologist in this investigation is aimed at assisting participants to apply skills from psychology group to their exercise activities. Thus, this intervention would functionally address barriers to full participation in physical therapy. The incorporation of this additional training for participants is hypothesized result in increased compliance with, and effectiveness of physical exercises as measured by increased muscular strength. As such, hypothesis two includes the following prediction:

2.F. It is predicted that there will be a significantly greater increase in levels of muscular strength reported by participants in the experimental condition when compared with control condition participants.

Chapter Two

Method

Participants

Participants were approximately 18 male and female adults from the Missoula area. All participants were at least 18 years of age and met Diagnostic and Statistical Manual of Mental Disorders-4th edition Text Revision (DSM-IV-TR; American Psychological Association, 2000) duration criteria for Pain Disorder, Chronic (having pain in one or more body parts for at least six consistent months). As the treatment protocol in this study was not designed to be an intervention utilized with individuals who were actively abusing or dependent on illicit drugs and/or alcohol and/or individuals who were actively psychotic (according to DSM-IV criteria) these individuals were not included in the study sample. In addition, all participants were required to arrange their own transportation to the study location (Skaggs Building at the University of Montana), to participate on the dates and times designated by study investigators, and to understand English (spoken and written). As all participants reported chronic physical pain and would be required to participate in physical exercise, each was required to obtain a physician's approval of his/her ability to participate in the study. Participants who did not receive their physician's approval to participate, or those who reported uncontrolled hypertension or chronic coronary condition, were not eligible for participation. All inclusion/exclusion criteria (stated above) are presented in the telephone script screening form in Appendix C.

Participants were recruited through referrals, flyers, and newspaper advertisements. To recruit participants, some local physicians and other medical providers were contacted and made aware of the project so that they could refer patients. Also, flyers including the project's location, duration, the contact phone number for the principal investigators as well as a brief description of services available through participation were placed at local medical centers (see Appendix A). In addition, an advertisement for the study, with information identical to that on study flyers were placed in the Kaimin, Missoulian, and the Missoula Independent and were run periodically prior to and over the duration of the study (also see Appendix B).

Procedure

The entire study was conducted in the Skaggs Building and the Clinical Psychology Center at the University of Montana. The exercise group meetings as well as the pre-physical activity screenings, exercise testing, and exercise training took place at the Applied Exercise Physiology Laboratory (SB 025). This lab is under the direction of James J. Laskin, P.T., Ph.D. – a faculty member in the Department of Physical Therapy at the University of Montana and a co-investigator in this project. The facility itself is ideally located adjacent to the elevator and accessible washrooms and change rooms. Psychology groups were conducted in previously reserved conference rooms (either SB111 or 102) on the first floor of the Skaggs Building as well as in the Clinical Psychology Center (CPC 121). All sessions were conducted by project investigators and staff (graduate level students in psychology and physical therapy, under the supervision of a licensed clinical psychologist and physical therapist).

Pre-Group Procedures

All interested individuals completed a telephone screening questionnaire to determine their eligibility for the study (Appendix C). Individuals who were not eligible for participation received referrals for alternative service providers (e.g., New Directions, Montana Pain Treatment Center at The Center for Behavioral Medicine, St. Patrick's Hospital and Health Sciences Center). All eligible individuals were assigned to either the *control condition* (traditional multidisciplinary pain treatment including four weeks of psychotherapy group and six weeks of exercise group) or to the *experimental condition* (traditional multidisciplinary pain treatment including four weeks of psychotherapy group and six weeks of exercise group, plus involvement of the psychologist during the first four weeks of exercise sessions and the physical therapist during the one of the psychology group sessions) through use of a randomized coin toss procedure.

Prior to participation, all interested, eligible individuals came to the University of Montana and completed a questionnaire packet including 1) an informed consent form (see Appendix D), 2) a separate sheet with their name and a predetermined study identification number (see Appendix E), 3) a form that granted project staff permission to contact the participant's physician regarding his/her ability to participate in the study (see Appendix F & G), and 4) a questionnaire packet that included the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977), Tampa Scale (TS; Clark, Kori, & Broeckel, 1992), Pain Anxiety Symptoms Scale (PASS; McCracken, Zayfert, & Gross, 1992), McGill Pain Questionnaire – Short Form (MPQ – SF; Melzack, 1987), Pain Disability Index (PDI; Pollard, 1984), and a demographic questionnaire

which included questions about brief medical history, participants age, gender, race, ethnicity, marital status, education, physical illnesses or impairments, past or present psychiatric diagnoses, current prescription and non-prescription medications and their uses, current treatments for pain conditions, past treatments for pain, questions related to past or current litigation related to pain, and typical amount of sleep per week (the entire questionnaire is included in Appendix H). At this first meeting, all potential participants were also evaluated for their readiness for exercise by James Laskin, P.T., Ph.D. Information regarding the participant's physical health was collected, and participants were weighed and oriented to the physical therapy lab and exercise equipment.

At the end of this first appointment, all participants returned all completed forms and questionnaires. Each participant was also provided with a form with information including the time, date, and location of their first psychology group meeting and exercise session, as well as a phone number where the project coordinator could be reached, and the name of the project (Appendix I). Importantly, participants did not begin their exercise regimen until after a physician's approval was received (Appendix G). Individuals were informed of the physician's decision regarding their participation as soon as possible and absolutely prior to participation in psychology and exercise groups.

Study Week 1 through 6 Procedures

All participants engaged in the activities summarized in the table below. Pre-group procedures and questionnaires have been described previously. The following sections describe groups and evaluations experienced by all participants, as well as enhanced procedures that were added to psychology groups and exercise groups for the

experimental condition only. Importantly, psychology and exercise groups composed of individuals assigned to the experimental condition were held separately from psychology and exercise groups of composed of individual assigned to the control condition.

Table 1. Schedule of Project Activities

Week	Pre	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6
Pre-group Procedures	X						
Psychology Group		X	X	X	X		
Exercise Group		X	X	X	X	X	X
Exercise Testing		X					X
Questionnaire Packet	X				X		
Fidelity Measures		X	X	X	X	x	x

Psychotherapy Groups

All participants attended two, 1.5-hour psychotherapy groups each week (on Monday and Wednesday evenings) for a period of four consecutive weeks. These groups were lead by graduate students in the Clinical Psychology Program at the University of Montana¹ who were supervised by a licensed clinical psychologist (John Klocek, Ph.D., Associate Professor of Psychology, University of Montana). These groups followed guidelines for traditional psychological/behavioral pain management groups outlined by Caudill (2002). The format of this group was primarily skill oriented with an emphasis on skills useful for coping with and reducing chronic pain.

¹ Clinical psychology graduate students who have not yet completed their Master's Thesis were trained to conduct psychology groups. This training was supervised by John W. Klocek, Ph.D. and involved observation of current groups and training in administration of group protocols and group sessions.

Topics included education about pain, relaxation training, activity rest cycling, fighting dysfunctional attitudes and depression, communication, skills to enhance exercise, nutrition, adjustment and role transition, and medication adherence.

Experimental Intervention – Psychology Group

Participants in the experimental condition participated in psychology groups identical to those described above with one exception; the addition of an enhanced activity-rest cycling session led by a physical therapist. Although all participants received information about activity-rest cycling during the fifth psychology group session, those assigned to the experimental condition also received additional information about what to expect when exercising, discerning between soreness and problematic (new) pain flare-ups, energy conservation, and posture reeducation, which was presented by the physical therapist.

Physical Therapy/Exercise Groups

All participants completed three, 45 to 60 minute, exercise sessions per week. The exercise sessions were constructed following the guidelines set forth by the American College of Sports Medicine and adapted for this population by Dr. Laskin (Laskin, 2001). The goal of the exercise sessions was to improve participants' muscular strength. The control condition represented the standard physical therapy approach and was contrasted with an "enhanced" physical therapy group treatment (see description of Experimental Intervention section below).

As previously noted, Dr. Laskin collected information regarding each participant's medical history and physical condition at the initial screening meeting. This

was done as part of an evaluation to determine each participant's readiness to engage in exercise. The remainder of this exercise evaluation, conducted to establish each participant's baseline muscular strength, was held during participants' first week of exercise group following orientation of all participants to exercise testing procedures. Following this initial exercise evaluation, an exercise program was designed for each participant. The individualized, supervised exercise program was also based on and modified by the test data acquired during each test session (see evaluation section below for a description of exercise evaluation).

During the initial four weeks of the program, exercise sessions were held three times per week immediately prior to or following the psychotherapy group sessions. Following completion of the psychotherapy group, the participants attended the supervised exercise program three times per week until the completion of the study (weeks five through six). Participants engaged in activities such as seated chest press, seated row, seated leg press, seated leg extensions, seated abdominal crunches, and as part of a larger study they participated in cardiovascular activities using a treadmill (Life Fitness, Chicago, IL), cycle ergometer (Monark, Sweden), New Step (New Step, Ann Arbor, MI), or arm ergometer (SCIFIT, Tulsa, OK). Physical therapy/exercise groups were conducted under the direct supervision of a physical therapist until such a time as the physical therapist released them to exercise under the supervision of a student physical therapist in the Physical Therapy Program at the University of Montana, supervised by James Laskin, P.T., Ph.D.

Experimental Intervention – Physical Therapy/Exercise Group

Participants in the experimental condition participated in physical therapy sessions identical to those described above with one exception; participants in the experimental condition benefited not only from the supervision of a graduate physical therapist and physical therapy student (supervised by a licensed physical therapist), but also from the supervision of a graduate clinical psychology student (supervised by a licensed clinical psychologist) who worked to reinforce the lessons and strategies learned in the group psychotherapy sessions. For example, during an exercise session, the psychology group leader coached and/or encouraged participants to utilize deep breathing and visualization techniques, somatic focusing, and cognitive re-framing of maladaptive thoughts prior to, during, and following physical activity. The psychology graduate student was present to reinforce strategies and skills during the first four weeks of exercise group meetings only.

Frequency of coaching and encouragement occurred on a rotating basis (e.g., psychology group leader checked on each client multiple times during each group session). An effort was made to ensure that all clients received approximately the same amount of contact with the group leader during each session; however, the amount of time spent with each participant was also based on his/her specific needs (e.g., more time was spent on skills when client's requested help, additional time was spent on helping clients determine which skills were the most helpful for them, time was devoted to helping clients who reported difficulty deciding which skills to use in different circumstances, etc.).

As this study was exploratory in nature (e.g., there is not yet evidence to support differences in treatment effectiveness due to the presence of the psychologist in physical therapy groups for individuals with chronic pain conditions), the frequency and content of contact with participants was not standardized or measured. These measurements may be added to the study in the future as part of research investigations that are conducted as part of the continuation of this project.

Evaluation

All participants completed questionnaire packets, identical to those completed at intake (Appendix H), following the initial 4 weeks of the study. All participants were also asked to answer questions each week for the entire six-week investigation regarding their use of and satisfaction with procedures and information (e.g., techniques and information that is provided by psychologists during psychotherapy group sessions) while engaged in physical therapy/exercise (see fidelity measures -Appendix J). In addition, all participants answered a questionnaire related to their overall use of study techniques and overall satisfaction with the program at the end of the study (see Appendix K – change this on form).

To assess the participants' physiological adaptations to the six-week physical therapy/exercise program, measures of muscular strength (Laskin, 2001) were administered upon entry to the program and again during the sixth week. Muscular strength was assessed by using a simple 8-repetition maximum protocol (8RM). Specific testing procedures for muscular strength are described in the measures section below.

At the end of the study, all participants (those in both experimental and control conditions) received a debriefing form that explained the purpose, hypotheses, and potential application of the present study (see APPENDIX L). Participants were also thanked for their participation in the study.

Measures²

Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977)

The CES-D is a 20-item measure of depressive symptomatology. Each item is rated on a four-point Likert-type scale with higher scores reflecting increasing depressive symptomatology. Alpha coefficients for the CES-D have been found to range from .85 in the general population to .90 in a psychiatric population (Radloff, 1977). Previous investigations have found that some measures of depressive symptoms, which contain large numbers of items related to somatic difficulties (e.g., sleep disturbance, fluctuation in weight, fatigue, etc.) may artificially inflate the scores of individuals with certain chronic pain conditions such as rheumatoid arthritis and systemic lupus erythematosus (e.g., the BDI; Wesley, Gatchel, Polatin, Kinney, & Mayer, 1991; Williams & Richardson, 1993).

Higher cutoff scores have been developed to detect significant depressive symptoms in chronic pain samples (from 14 in non-pain populations to 27 in chronic pain populations) in order to ensure adequate sensitivity and specificity of this measure to a chronic pain population (Geisser, Roth, & Robinson, 1997). Using these cutoff scores,

² All psychology measures described in the measures section are included in Appendix H. Physiological measures are not listed in Appendix H, as data from physiological procedures were recorded directly into a computer program.

the CES-D has demonstrated superior sensitivity to changes in severity of depressive symptoms when compared to the BDI (Santor, Zuroff, Ramsey, Cervantes, & Palacios, 1995). Thus, the CES-D has been recommended for use with chronic pain populations (Bradley, 1994; Bradley & McKendree-Smith, 2001). This questionnaire was completed by all participants prior to week one and following week four of participation.

Tampa Scale (TS; Clark, Kori, & Broeckel, 1992):

This scale was developed as a measure of the fear of movement/reinjury also called *kinesiophobia* (Kori, Miller, & Todd, 1990). The TS is a 13-item measure with items rated on a four-point Likert-type scale with ratings on each item ranging from 1 (strongly disagree) to 4 (strongly agree). Higher scores on the TS indicate a greater degree of kinesiophobia.

Internal consistency has been demonstrated for this scale with alpha coefficient .86 (Clark et al., 1996). Studies have found evidence for predictive validity with the TS. Specifically, the TS has been correlated with pain patients' self-report measures of depression and catastrophizing and negative affect as well as with performance on behavioral tasks including lifting, trunk extension-flexion, and muscle reactivity (Crombez, et al., 1999; Vlaeyen, et al., 1995). This questionnaire was completed by all participants prior to week one of participation and following week four of the program.

Pain Anxiety Symptoms Scale (PASS; McCracken, Zayfert, & Gross, 1992):

This is a 53-item scale, which measures fear of pain in cognitive, behavioral, and physiological domains. There are four subscales: Fear of Pain, Cognitive Anxiety, Somatic Anxiety, and Escape/Avoidance. Items are rated on a six point Likert-type scale

with responses for each item ranging from 0 (never) to 5 (always) with higher scores reflecting an increasing degree of pain related anxiety; however, participants' full-scale scores were used for analyses in the present investigation.

Chronbach's Alphas have been shown to range from .81 to .89 for subscales to .94 for the total score (McCracken, et al., 1992). In addition, evidence for construct validity has been established through moderate correlations between PASS full-scale scores and other measures of anxiety and between PASS subscales and similar measures of anxiety in respective domains (McCracken et al., 1992). Concurrent validity has been demonstrated for this measure when correlated with other measures including the Pain Disability Index (McCracken et al, 1992), and evidence for predictive validity has also been established (e.g., the PASS was found to be a better predictor of disability and general interference than general measures of anxiety, emotional distress, as well as of self-reported anxiety related to strength and exercise capacity (McCracken et al., 1992; Burns et al., 2000). This questionnaire was completed by all participants prior to week one of participation, and following week four of the program.

The Short Form McGill Pain Questionnaire (SF-MPQ; Melzack, 1987):

The SF-MPQ was developed for use in research settings to measure pain intensity. This measure includes three components of the standard McGill Pain Questionnaire. First, 15 representative words from sensory (throbbing, shooting, stabbing, sharp, cramping, gnawing, hot-burning, aching, heavy, tender, and splitting) and affective (tiring-exhausting, sickening, fearful, and punishing-cruel) scales of the original MPQ Pain Rating Index (PRI) are listed. Each item receives a ranking from 0

(none) to 3 (severe) for pain intensity. The PRI total score is calculated by summing all ranked values with higher scores reflecting more intense pain. The present investigation utilized the PRI as the index of participants' self-reported pain.

Two other indices (the Present Pain Intensity index (PPI) and Visual Analog Scale (VAS) from the original measure) that are used to measure overall pain intensity at the time of administration. The PPI consists of a list of adjectives, each representing a increasingly intense pain rating (0 = no pain, 1 = mild, 2 = discomforting, 3 = distressing, 4 = horrible, and 5 = excruciating). The score for this index reflects the value for the adjective that is endorsed by the individual. The VAS is a 10 cm vertical line with two endpoints labeled "no pain" and "worst pain possible". Participants are to place a mark at the spot on the line that best represents their pain at the moment. Scores are derived from measurement in millimeters (0 to 100; from the low end of the scale to the patient's mark).

The SF-MPQ Sensory and Affective as well as Total Scale scores correlate very highly with the standard MPQ, which has been shown to have good reliability and validity (e.g., Reading, Everett, & Sledmere, 1982, Reading, 1989; Love, Leboeuf, & Crisp, 1989). The SF-MPQ has been shown to be sensitive to clinical changes related to several different therapies designed to reduce perceived pain (e.g., Harden, Carter, Gilman, Gross, & Peters, 1991; Searro, Marks, Morley, & Goodchild, 1992). Concurrent validity for this measure was demonstrated in a study with cancer patients (Dudegeon, Ranbertas, & Rosenthal, 1993). This questionnaire was completed by all participants prior to week one of participation as well as following the fourth week of the program.

Pain Disability Index (PDI; Pollard, 1984):

The PDI was developed as a brief self-report measure of pain related disability. It includes seven questions, each measuring the degree to which pain is believed to interfere with functioning in the areas of family/home responsibility, recreation, social activities, occupation, sexual behavior, self-care, and life support activity. Items are rated on an eleven-point scale 0 (no disability) to 10 (total disability). The present investigation utilized the sum of participant ratings across all areas of functioning as the index of pain disability.

Internal consistency has been demonstrated by this measure (Chronbach's Alpha = .86; Tait, Chibnall, & Krause, 1990). Adequate test-retest reliability has been shown for this measure ($r = .44$; Chibnall & Tait, 1994). The PDI has also received empirical support for its ability to discriminate among groups of individuals with and without chronic pain (e.g., Yaari, Eisenberg, Adler, & Birkhan, 1999) and between individuals who engage in fewer or greater number of pain behaviors (Chibnall & Tait, 1994). This questionnaire was completed by all participants prior to week one and following week four of participation.

Demographic questionnaire:

The demographic questionnaire contained a brief medical history, requesting information about the participants age, gender, race, ethnicity, education, physical illnesses or impairments, past or present psychiatric diagnoses, current prescription and non-prescription medications and their uses, current treatments for pain conditions, past treatments for pain, past and current litigation related to pain or medical conditions,

frequency of medical and surgical care, and typical amount of nightly sleep. This questionnaire was completed by all participants prior to week one of participation.

Fidelity Measure:

This measure was designed by the principal investigator to determine the extent that certain techniques, which are learned in psychotherapy group, are applied during each week in exercise group. Additionally, this instrument measures the level of satisfaction participants experience as a result of using individual psychological techniques during exercise sessions. Techniques included in the measure are 1) relaxation techniques, 2) somatic focusing techniques, 3) altering maladaptive thoughts/dysfunctional beliefs, and 4) distraction techniques. The measure consists of eight items, each with a Likert-type scale with scores on each item ranging from 1 (not at all/not at all effective) to 7 (very much/very effective). All items were examined independently, and for the purposes of this project, an aggregate score for each item across the six weeks of the study (created by summing ratings for each item across the six weeks) for total use or satisfaction/efficacy of all techniques was calculated with higher scores reflecting greater fidelity. This measure was administered to each participant at the end of each week for all six-weeks of the program.

8 Repetition Maximum (Laskin, 2001).

The 8RM protocol was performed (as appropriate) with the exercises of seated chest press and seated leg press (Life Fitness, Chicago, IL). The protocol calls for the individual to lift as much weight as they can eight times. The protocol for this study asks participants to perform the given exercise no more than 12 times, each time adding more

weight until the individual can only perform the exercise between six and ten times, results in the 8RM determination. Each participant's maximum weight is determined by the product of the weight (in lbs) that the participant is lifting times the number of repetitions they complete during their 8RM set. The increments in weights used are determined by the investigators' experience and the participants' feedback. This measure was administered to all participants at weeks one and six of the project.

Chapter Three

Results

A total of 121 individuals were contacted regarding their interest in the present investigation. Of these individuals 62 completed screening measures, 32 were either not eligible or not interested, and 30 began participation. Twelve participants dropped out of the study following the initial intake evaluation leaving a total of 18 individuals with chronic pain who participated in the six-week investigation. Of these individuals, 10 were assigned to the control condition, and 8 were assigned to the experimental condition.

Twenty percent of participants were male and 80% were female. Ages of participants ranged from 23 to 68 with a mean age of 48.53. One hundred percent of study participants were Caucasian. All participants reported education levels of at least 12 years with a mean of 14.00. Approximately forty-five percent of participants were unemployed, 23.80% of participants were employed full or part time, 19.00% were retired specifically because of their pain condition, and the remainder (14.40%) reported either working as a homemaker, being retired (for reasons other than pain), or working as a volunteer. Almost half of all participants (47.60%) currently receive compensation or disability payments, and another 22.20% reported that they have compensation or disability applications pending; however, no study participants reported involvement with current litigation related to their pain conditions. Participants reported that they have experienced chronic pain for an average of 87.78 months – more than seven years. Additionally, participants reported an average of 8.35 annual physician office visits for their chronic pain, an average of 2.68 annual hospital visits related to their chronic pain,

and reported an average of 1.67 surgeries for chronic pain over the past year. Over 95% of all participants have received past treatments for their chronic pain. Importantly, some participants reportedly receive current chronic pain treatment in addition to the treatment that is provided as part of the present investigation. Specifically, 6 participants (28.60%) endorsed current use of pain medications, 2 participants (9.50%) currently use exercise, 2 participants (9.50%) use TENS units, 2 participants (9.50%) receive psychotherapy, 2 participants (9.50%) reportedly receive hypnotherapy, 1 participant (4.80%) reported use of relaxation techniques, 1 participant (4.80%) currently receives physical therapy, 1 participant (4.80%) uses hydrotherapy, 1 participant (4.80%) utilizes acupuncture, and 1 participant (4.80%) currently uses some other type of treatment for their chronic pain.

Although participants were assigned to conditions using a randomization procedure (see methods section), independent samples t-tests were conducted to identify any significant, initial differences between participants assigned to the control and experimental conditions. Means and t-values for all study dependent variables at baseline are presented in Table 2. There were no significant differences between individuals assigned to the control versus the experimental condition on demographic variables. However, mean scores at baseline for participants in the control condition were significantly higher than mean scores for participants in the experimental condition on pain related anxiety, kinesiophobia, and pain related disability. Observation of the data suggests that the means described below were not influenced by the presence of outliers. Further, the means and standard deviations reported in Table 2 are similar to those reported in some other recent investigations related to chronic pain treatment. For

example an investigation by Harris and colleagues (2003) reported Pain Disability Index ratings with a mean of 43.40, and a standard deviation of 13.26.

Table 2.

Results of Independent Samples T-Tests for Dependent Variables for Participants in the Experimental and Control Conditions at Baseline, Excluding Demographic Variables.

Variable	n(E)	Experimental		n(C)	Control		df	t
		M	s		M	s		
T1 CESD	8	41.79	4.81	10	45.62	7.69	16	-1.227
T1 MPQ	7	23.71	8.20	10	31.94	12.53	15	-1.517
T1 PASS	8	71.13	30.37	10	113.20	25.09	16	-3.273**
T1 PDI	8	37.00	8.16	10	52.70	8.19	16	-4.047***
T1 TSK	8	37.38	4.96	9	46.65	4.11	15	-4.218***
T1 8RM L	7	2505.71	1558.67	7	1565.71	704.31	12	1.454
T1 8RM C	7	641.42	256.27	6	414.17	98.51	11	2.037

* = $p < .05$; ** = $p < .01$; *** = $p < .001$. For CESD, MPQ, PASS, PDI, and TSK, T1 = the pre-study evaluation period. For variables 8RM L and C, T1 = week 1 of the investigation. n(E) = number of experimental participants. n(C) = number of control participants. Variable names are as follows: CESD = Center for Epidemiological Studies Depression Scale, MPQ = the McGill Pain Questionnaire – Short Form – pain rating index, PASS = the Pain Anxiety Symptom Scale, PDI = the Pain Disability Index, TSK = the Tampa Scale for Kinesiophobia, 8RML and 8RMC refer to the 8 Repetition Maximum for leg press and chest press respectively.

Participants in the control and experimental conditions did not significantly differ with respect to age ($t(13) = -.228, p > .05$), education ($t(16) = -.802, p > .05$), length of time with chronic pain ($t(15) = 1.232, p > .05$), number of pain-related ($t(16) = -1.684, p > .05$) or non-pain related ($t(16) = .045, p > .05$) doctors visits in the past year, number of pain related ($t(15) = -1.500, p > .05$) or non-pain related hospitalizations ($t(16) = 1.152, p > .05$), number of pain-related surgeries ($t(3) = -.447, p > .05$) over the past year, or amount of daily sleep ($t(15) = .027, p > .05$).

Results of Study Hypotheses

As previously stated, hypothesis one predicted that all participants would improve on all dependent measures (pain perception, pain related disability, depressive symptoms, pain-related anxiety, kinesiophobia, and 8RM). To test hypothesis one, 2 (Group) X 2 (Time) mixed ANOVA's were performed for each dependent variable. Significance testing for the main effects and interaction was done using an alpha of .05. Parallel analyses were conducted for each prediction in hypothesis two, which predicted that participants in the experimental condition would improve over and above those in the control condition on all dependent measures. A measure of effect size (eta squared; η^2) was calculated for each interaction and main effect.

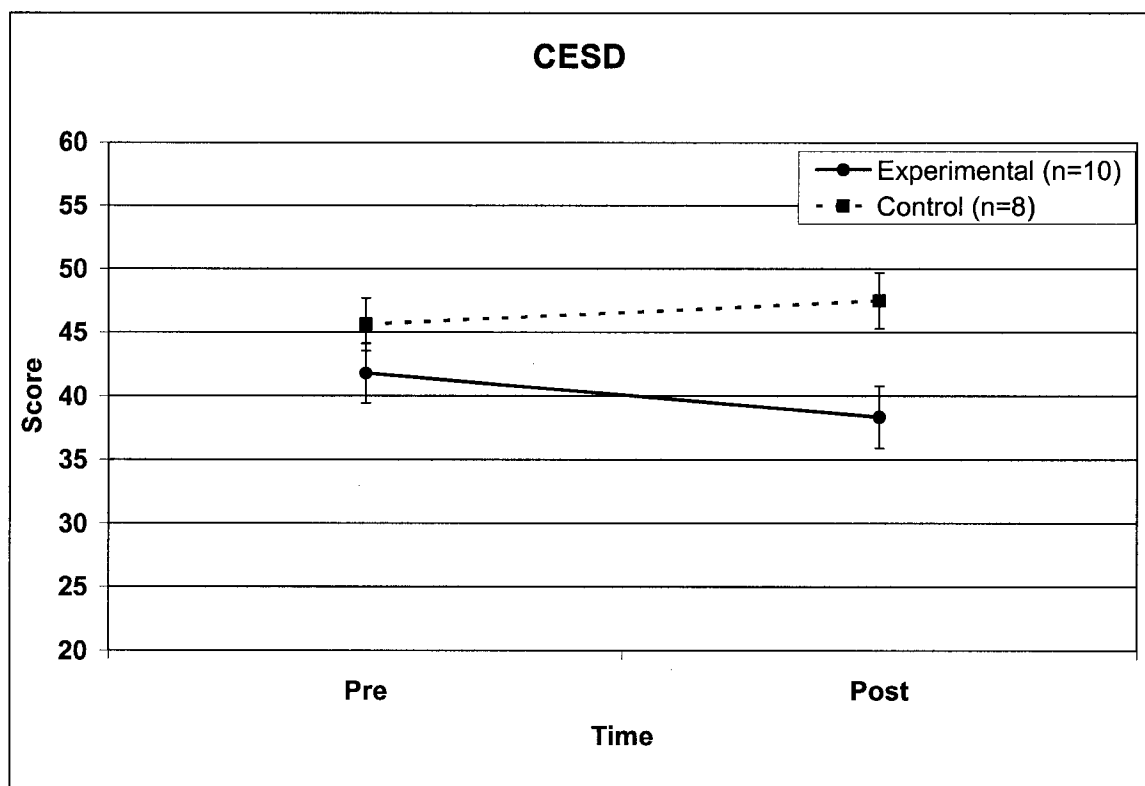
Depression (CES-D)

A 2 (Group) X 2 (Time) mixed-design ANOVA was conducted on participants' depression symptom level. No significant interaction was found for condition by time ($F(1,16) = 3.765, p > .05, \eta^2 = 0.191$). The main effect for time was not significant ($F(1,16) = .243, p > .05, \eta^2 = 0.015$). The main effect for condition was significant ($F(1,16) = 4.680, p < .05; \eta^2 = 0.226$). These results suggest that control and experimental participants were different in terms of their levels of depression over the course of the study, with control participants consistently demonstrating greater levels of depressive symptoms. Independent samples t-tests showed that there were no significant between-group differences present at baseline ($t(16) = -1.227, p > .05$). Participants' mean level of depression did not significantly differ as a function of time, or the interaction of condition by time. However, analyses showed a fairly large effect size,

suggesting that this interaction may become significant with the addition of a larger sample size and increased power.

Although differences between control and experimental participants were not all statistically significant, there was a trend for means of those in the experimental condition to decrease, and for means of those in the control condition to increase or to remain constant. Means for each condition at each time period are presented in Figure 1 below.

Figure 1.

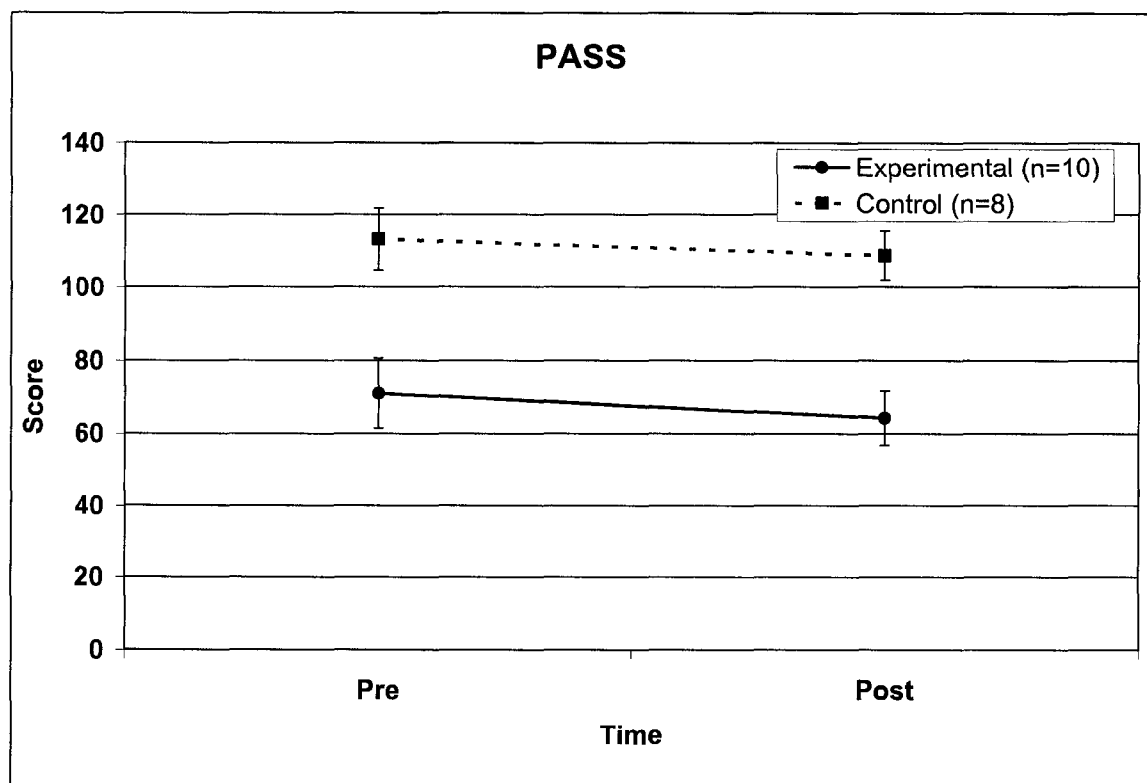


Pain Related Anxiety (PASS)

A 2 (Group) X 2 (Time) mixed-design ANOVA was conducted on participants' pain related anxiety symptom level. No significant interaction was found for condition by time ($F(1,16) = .114, p > .05, \eta^2 = 0.007$). The main effect for time was also non-significant ($F(1,16) = 2.751, p > .05, \eta^2 = 0.147$); however, the main effect for condition

was significant ($F(1,16) = 15.297, p < .01, \eta^2 = 0.489$). These results suggest that participants' ratings of pain related anxiety were significantly influenced by condition, with control participants consistently reporting greater mean levels of anxiety symptoms. Also, participants' ratings of pain related anxiety were not significantly influenced by time or by an interaction of these two factors. Importantly, findings related to the main effect for time yielded a large effect size, which may suggest that adding to the sample size would result in a significant main effect for time should one exist. T1 and T2 pain related anxiety mean scores for control and experimental participants are presented in Figure 2.

Figure 2.



Kinesiophobia (TS)

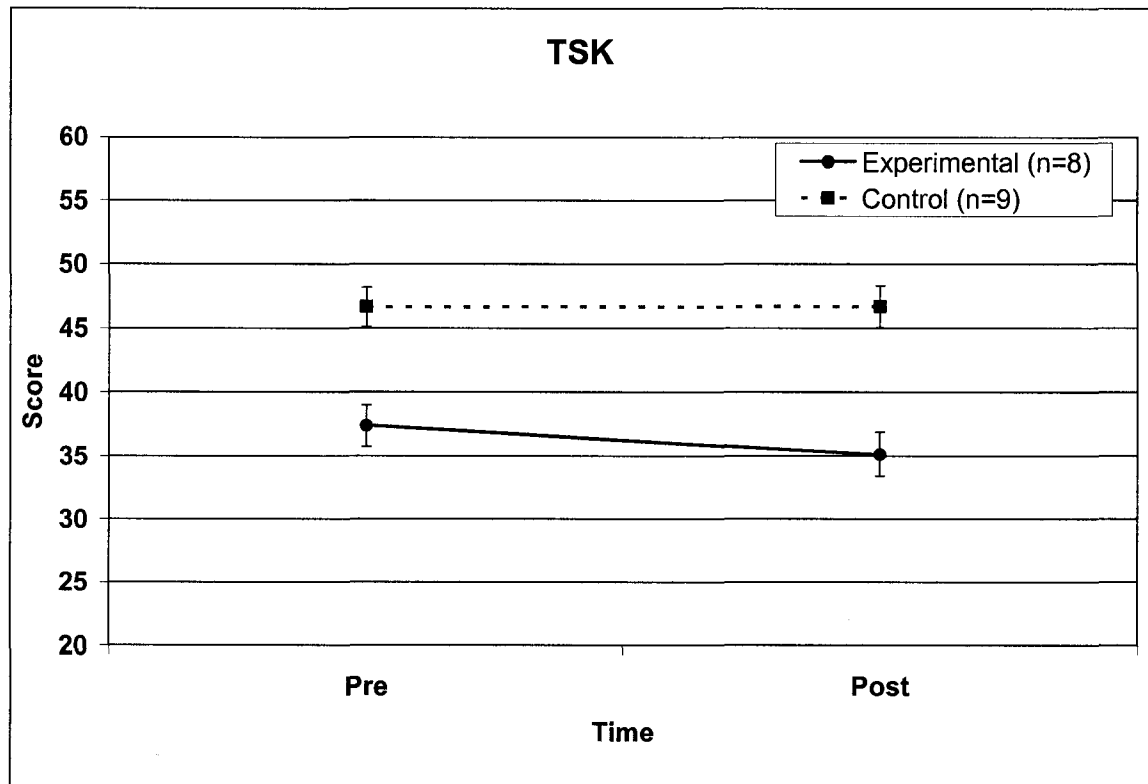
A 2 (Group) X 2 (Time) mixed-design ANOVA was conducted on participants' kinesiophobia symptom level. No significant interaction was found for condition by time ($F(1,15) = 1.720, p > .05, \eta^2 = 0.103$). The main effect for time ($F(1,15) = 1.678, p > .05, \eta^2 = 0.101$) was also non-significant. The main effect for condition ($F(1, 15) = 24.006, p < .001, \eta^2 = 0.615$) was significant. These results indicate that participants' ratings of kinesiophobia were not significantly influenced by time or by the interaction of time and condition, but were significantly influenced by condition, with control participants reporting significantly greater mean levels of kinesiophobia symptoms at both assessment periods. Additionally, the presence of a medium effect size could suggest that increasing sample size and power would reveal significant effects for time or the time by condition interaction if they were present.

Observation of the means for each condition at each assessment shows virtually no change in mean kinesiophobia ratings for participants in the control condition, while mean kinesiophobia ratings for those in the experimental condition decrease slightly over time. Means for each condition at each time period are presented in Figure 3 below.

Perceived Pain Intensity (MPQ-SF; PRI)

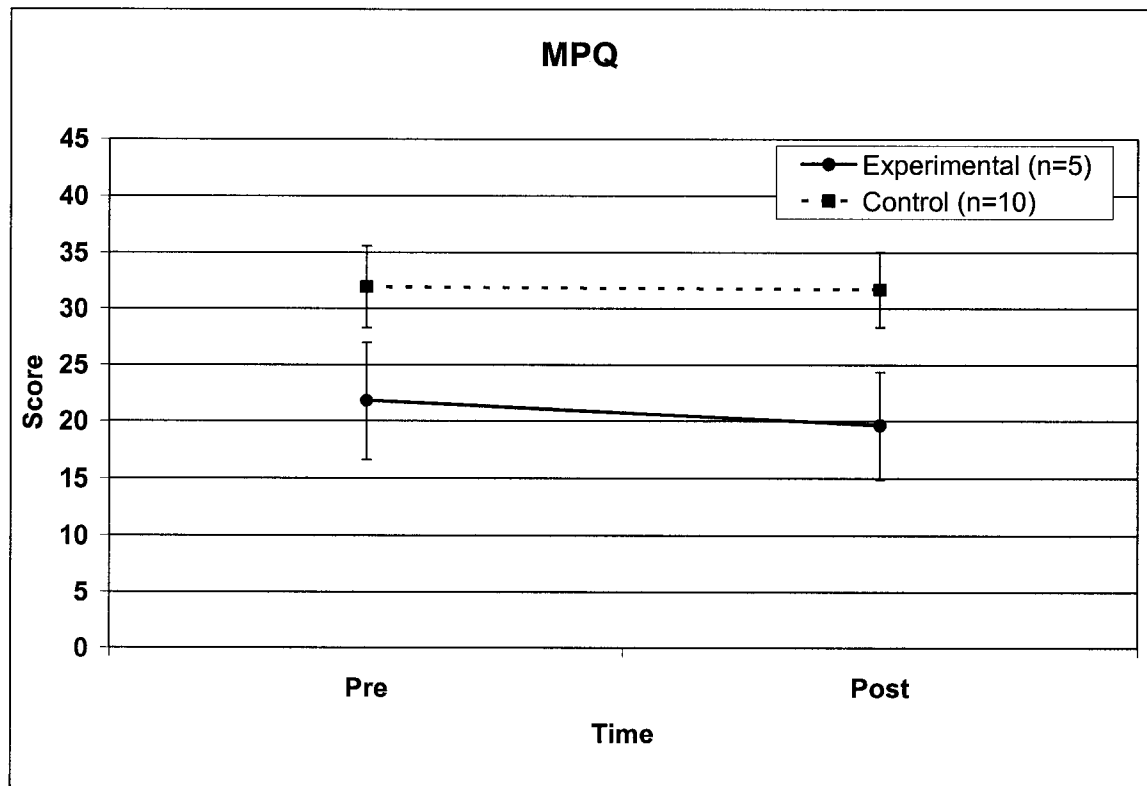
A 2 (Group) X 2 (Time) mixed-design ANOVA was conducted on participants' perceived pain intensity symptom level. No significant interaction was found for condition by time ($F(1,13) = .157, p > .05, \eta^2 = 0.012$). The main effect for time ($F(1,13) = .247, p > .05, \eta^2 = 0.019$) was not significant. The main effect for condition was not significant ($F(1,13) = 3.932, p > .05, \eta^2 = 0.232$). These findings suggest that participants' level of perceived pain was not significantly influenced by time, condition,

Figure 3.



or the interaction of these factors. However, a very large effect size suggests that an increased sample size could result in a significant main effect for treatment condition. It is unlikely that adding any number of participants would result in a significant interaction effect or in a significant main effect for time. Control participants tended to report greater mean pain intensity symptoms levels. There was a slight trend for experimental participants' mean scores to decrease over time, whereas there was virtually no change for means in the control condition. Mean scores for each condition at each time period are presented in Figure 4 below.

Figure 4.



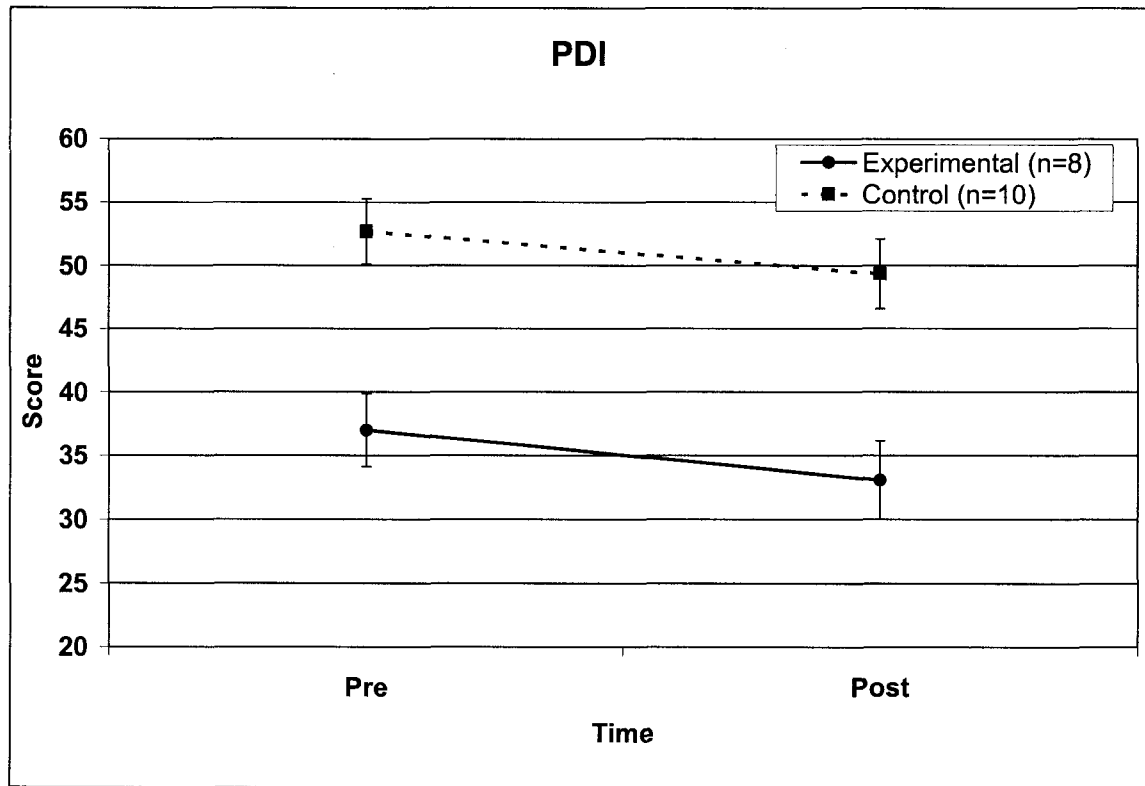
Pain Related Disability (PDI)

A 2 (Group) X 2 (Time) mixed-design ANOVA was conducted on participants' pain related disability level. No significant interaction was found ($F(1,16) = .048$, $p > .05$, $\eta^2 = 0.003$); however, the main effect time ($F(1,16) = 7.865$, $p < .05$, $\eta^2 = 0.330$), and the main effect for condition were significant ($F(1,16) = 17.754$, $p < .05$, $\eta^2 = 0.526$). These results indicate that participants' overall mean ratings of pain disability differed significantly with respect to time and condition, but were not influenced by the interaction of these two factors. Specifically, mean pain disability scores were consistently higher for those in the control condition, and mean values for all participants decreased significantly over time, regardless of group assignment. This suggests that

regardless of treatment condition, the treatment works to reduce pain related disability.

Mean values are shown in Figure 5 below.

Figure 5.

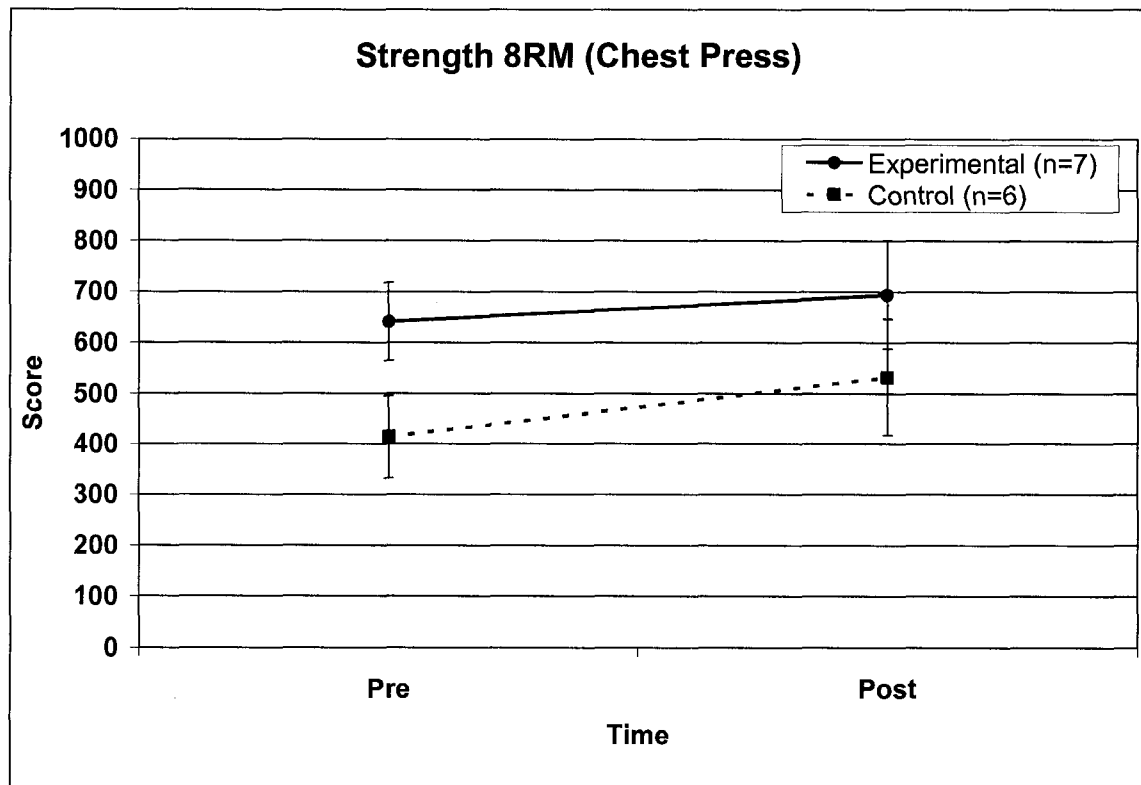


Strength (8RM – chest press)

A 2 (Group) X 2 (Time) mixed-design ANOVA was conducted on participants' strength as measured by their total workload (8RM) on the chest press. No significant interaction was found for condition by time ($F(1,11) = .853, p > .05, \eta^2 = 0.072$). The main effect for time ($F(1,11) = 5.834, p < .05, \eta^2 = 0.347$) was significant. The main effect for condition was not significant ($F(1,11) = 2.198, p > .05, \eta^2 = 0.166$). These results indicate that participants' mean strength as measured by the 8RM chest press was not significantly influenced by condition, or an interaction of these factors. However, participants mean strength was significantly influenced by time, with overall means

increasing over the course of the study from week 1 ($M = 536.54$, $s = 225.36$ lbs) to week 6 ($M = 619.62$ lbs., $s = 282.09$ lbs.) of the study. Mean values for experimental and control participants' 8RM chest press are presented in Figure 6 below.

Figure 6.



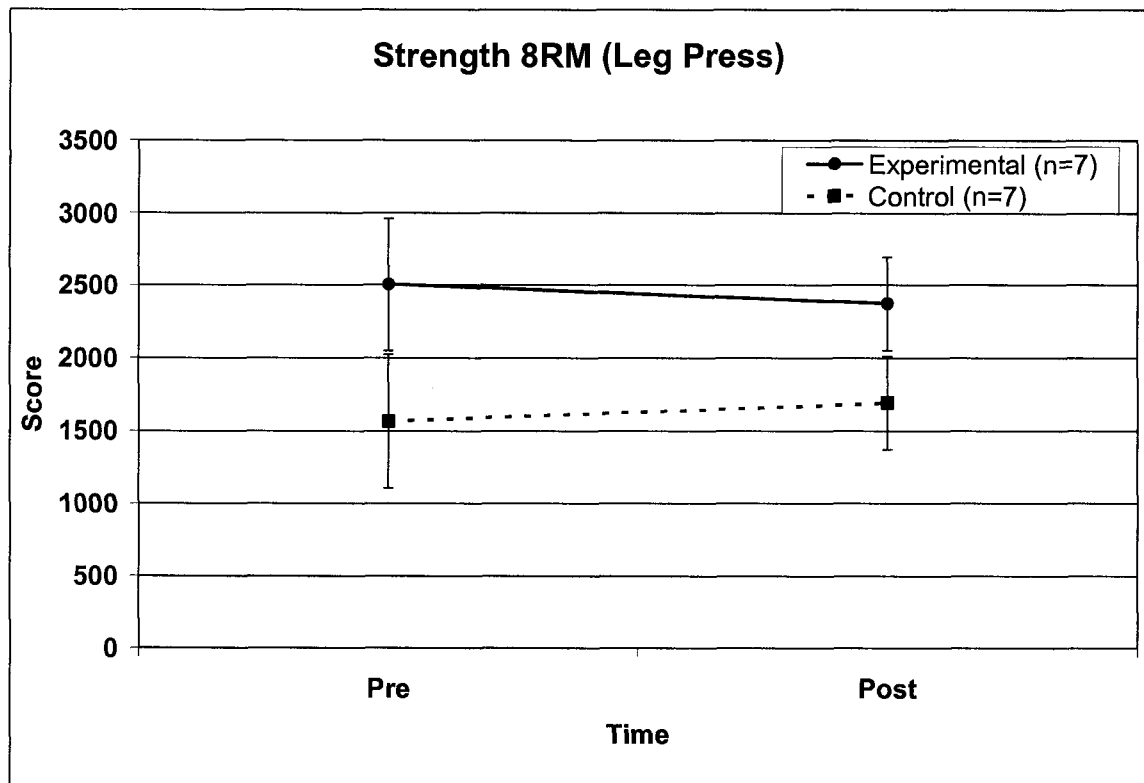
Strength (8RM – leg press)

A 2 (Group) X 2 (Time) mixed-design ANOVA was conducted on participants' strength as measured by their total workload (8RM) on the leg press. No significant interaction was found for condition by time ($F(1,12) = .599$, $p > .05$, $\eta^2 = 0.048$). The main effect for time ($F(1,12) = .000$, $p > .05$, $\eta^2 = 0.000$) was not significant. The main effect for condition was not significant ($F(1,12) = 2.317$, $p > .05$, $\eta^2 = 0.162$).

These results indicate that participants' mean strength as measured by the 8RM leg press were not significantly influenced by time, condition, or an interaction of these

factors. There was not a consistent trend for overall participant means to increase over the course of the study from week 1 ($M = 2035.00\text{lbs.}$, $s = 1558.67\text{lbs.}$) to week 6 ($M = 2032.86\text{lbs.}$, $s = 886.43\text{lbs.}$). Means are presented in Figure 7 below.

Figure 7.



Results of Supporting Analyses

Zero order correlations were conducted for all study measures at baseline, and are presented in Table 3. Significant positive associations between baseline measures of pain related anxiety and depression, pain related anxiety and kinesiophobia, pain related anxiety, kinesiophobia, and pain related disability, and leg and chest strength, as well as significant negative relationships between pain related disability and strength at baseline are all reasonable and in expected directions. These relationships provide support for the construct validity of study measures.

Table 3.

Zero-Order Correlations for All Study Measures

Variable	1	2	3	4	5	6	7
1.T1 CESD							
2.T1 PASS	.466*						
3.T1 TSK	.429	.805**					
4.T1 MPQ	.179	.351	.369				
5.T1 PDI	.407	.717**	.781**	.428			
6.T1 8RML	-.004	.002	-.016	-.253	-.387		
7.T1 8RMC	-.047	-.216	-.120	-.479	-.567*	.796**	

* = $p < .05$; ** = $p < .01$; *** = $p < .001$; Variable names are as follows: CST8RM = 8 RM chest press, LEG8RM = 8RM leg press, PDI = Pain Disability Index, MPQ = the McGill Pain Questionnaire – short form – Pain Rating Index (PRI), TSK = Tampa Scale for Kinesiophobia, PASS = Pain Anxiety Symptom Scale, CESD = Center for Epidemiological Studies Depression Scale. The number following each variable indicates the study time period. For variables 1 – 5, T1 = pre-study period. For variables 6 and 7 T1 = week 1 of the study.

Means and standard deviations for each study variable at baseline and week 4 assessment periods can be seen in Table 4.

To provide some statistical control for possible confounds due to attrition, independent samples t-tests were conducted to determine whether there were any significant differences on dependent measures between those who completed the initial two time periods of investigation and those who did not. Means, standard deviations, and t-values at baseline were calculated for all dependent variables for completers (defined as those who provided baseline and post-test data for all study measures) and non-completers (defined as those who provided only baseline data), and are presented in Table 5. Significant mean differences were found for pain related anxiety, kinesiophobia, and pain related disability, with completers reporting higher values (e.g. more intense anxiety and kinesiophobia, and more pain related disability) for each of these variables at

baseline. There were no significant mean differences between completers and non-completers on baseline measures of depression or perceived pain. As all participants who

Table 4.

Means and Standard Deviations of Dependent Variables, Excluding Demographic Variables.

<u>Variable</u>	<u>n</u>	<u>Mean</u>	<u>Standard Deviation</u>
1. T1 CESD	18	43.92	6.69
2. T2 CESD	18	43.56	8.13
3. T1 MPQ	15	28.56	12.23
4. T2 MPQ	15	27.68	11.81
5. T1 PASS	18	94.50	33.97
6. T2 PASS	18	88.98	30.69
7. T1 PDI	18	45.72	11.29
8. T2 PDI	18	42.12	11.86
9. T1 TSK	17	42.29	6.48
10. T2 TSK	17	41.24	7.60
11. T1 8RM (LEG)	14	2035.71	1260.21
12. T2 8RM (LEG)	14	2030.86	886.43
13. T1 8RM (CHEST)	13	536.54	225.36
14. T2 8RM (CHEST)	13	619.62	282.09

For variables 1 through 10, T1 = the pre-study evaluation period, T2 = week 4 of the study. For Variables 11 through 14, T1 = week 1 of the study, T2 = week 6 of the study. Variable names are as follows: CESD = Center for Epidemiological Studies Depression Scale, MPQ = the McGill Pain Questionnaire – Short Form – pain rating index, PASS = the Pain Anxiety Symptom Scale, PDI = the Pain Disability Index, TSK = the Tampa Scale for Kinesiophobia, 8RM = 8 repetition max for either leg press or chest press.

received strength testing at baseline also completed strength testing at week six of the study, 8RM variables were not included in this analysis. Of the 26 participants included in this analysis, a total of 8 did not complete the four-week study period. Five of these non-completers were from the control condition, and the remaining 3 were from the experimental condition.

Table 5.

Results of Independent Samples T-Tests for Dependent Variables for Completers and Non-Completers, Excluding Demographic Variables.

Variable	n(c)	Completers		n(nc)	Non-Completers		df	t
		M	s		M	s		
1. T1 CESD	18	43.92	6.69	8	44.05	7.70	24	-.044
2. T1 MPQ	17	28.55	11.45	6	19.17	9.81	21	1.785
3. T1 PASS	18	94.50	33.97	8	60.88	36.30	24	2.283*
4. T1 PDI	18	45.72	11.29	6	28.89	20.51	22	2.563*
5. T1 TSK	17	42.29	6.48	8	34.88	6.13	23	2.712*

* = $p < .05$; ** = $p < .01$; *** = $p < .001$. For variables 1 through 5, T1 = the pre-study evaluation period. For Variables 7 through 8, T1 = week 1 of the study. Also, n(c) = n for completers, and n(nc) = n for non-completers. Variable names are as follows: CESD = Center for Epidemiological Studies Depression Scale, MPQ = the McGill Pain Questionnaire – Short Form – pain rating index, PASS = the Pain Anxiety Symptom Scale, PDI = the Pain Disability Index, TSK = the Tampa Scale for Kinesiophobia.

Independent samples t-tests were conducted as a manipulation check (e.g., to determine whether there were differences between control versus experimental participant's use of or satisfaction with psychological interventions utilized during the exercise groups as measured by the fidelity questionnaire). Means and t-values for the fidelity measure are presented in Table 6. There was a significant mean difference between experimental and control participants' satisfaction/efficacy ratings for somatic focusing techniques ($t(16) = 2.140$, $p < .05$) with experimental participants reporting greater satisfaction and efficacy for these techniques over the six-week study period. There was a nearly significant mean group difference for use of somatic focusing skills ($t(16) = 1.999$, $p = .063$) with experimental participants reporting a greater degree of use of these techniques over the course of the study. There were trends for experimental participants to report greater overall mean use of relaxation techniques ($t(16) = 1.504$, $p > .05$), and greater overall mean satisfaction/effectiveness of relaxation techniques ($t(16) = 1.557$, $p > .05$) over the 6-week study period. Importantly, there were approximately 5 point mean differences reported between conditions for each relaxation variable, with experimental participants reporting greater degree of use and satisfaction/effectiveness.

Additionally, there was a trend for experimental participants to report less frequent experience of dysfunctional thoughts and attitudes over the duration of the study ($t(16) = -1.504, p > .05$), with experimental participants reporting mean scores of 6-7 points lower for this variable. Participants' mean ratings of satisfaction/effectiveness of cognitive techniques used to combat dysfunctional attitudes was not significantly different between conditions ($t(16) = .775, p > .05$); however, experimental participants reported slightly greater mean ratings of satisfaction and effectiveness for cognitive techniques (e.g., mean ratings were approximately 3-4 points greater over the six weeks of the study). There were no significant mean differences or meaningful trends for ratings on items related to distraction techniques in this six-week period.

Table 6.

Results of Independent Samples T-Tests for Fidelity Measures (Use and Satisfaction).

Variable	Experimental (n=8)		Control (n=10)		df	t
	M	s	M	s		
1.FDURELAX	29.74	6.00	24.82	7.51	16	1.504
2.FDSRELAX	30.45	5.80	25.38	7.59	16	1.557
3.FDUDISTR	23.36	8.00	22.09	11.25	16	.269
4.FDSDISTR	24.52	9.11	22.17	11.73	16	.466
5.FDUSOMAT	20.00	11.02	11.58	6.76	16	2.140*
6.FDSSOMAT	20.38	10.98	11.72	5.96	16	1.999
7.FDUDYSF	12.90	5.55	19.46	10.16	16	-1.636
8.FDSDYSF	28.54	9.10	24.76	11.10	16	.775

* = $p < .05$; ** = $p < .01$; *** = $p < .001$. n (e) = n for the experimental condition, n (c) = n for the control condition. Variable names are as follows: FDURELAX = Mean frequency of use ratings for relaxation techniques (used during exercise group activities) over the 6 week study period, FDSRELAX = Mean degree of effectiveness/satisfaction ratings for relaxation techniques (used during exercise group activities) over first 6 week period, FDUDISTR = Mean frequency of use ratings for distraction techniques (used during exercise group activities) over the 6 weeks of the study, FDSDISTR = Mean degree of effectiveness/satisfaction ratings for distraction techniques (used during exercise group activities) over the 6 week study period, FDUSOMAT = Mean frequency of use ratings for somatic focusing techniques (used during exercise group activities) over the 6 week study period, FDSSOMAT = Mean degree of effectiveness/satisfaction ratings for somatic focusing techniques (used during exercise group activities) over the 6 week study period, FDUDYSF = Mean frequency of experiencing dysfunctional attitudes or thoughts (during exercise group activities) over the 6 week study period, FDSDYSF = Mean degree of effectiveness/satisfaction ratings for cognitive techniques used to address dysfunctional thoughts or attitudes (used during exercise group activities) over the 6 week study period.

Chapter Four

Discussion

The present study attempted to both replicate the findings of numerous investigations and reviews which demonstrate the effectiveness and/or efficacy of multidisciplinary chronic pain treatment approaches (e.g., Flor, et al., 1992; Haldorsen et al., 2002; Basler et al., 1997; Bendix et al., 1997, etc.), and evaluate an enhanced multidisciplinary treatment program for chronic pain. Thus, an initial goal of this investigation was the demonstration of the overall effectiveness of treatment modalities, including group psychotherapy/psychoeducation, and physical therapy/exercise as measured by pain perception, pain disability, depression, pain related anxiety, kinesiophobia, and muscular strength. A second goal of this project was to determine whether enhanced collaboration between psychology providers and physical therapy providers would result in increased improvements, as measured by study outcome variables, when compared to treatment as usual. Additionally, the study examined whether participant' use of or satisfaction with psychological techniques during the exercise component of treatment were increased for participants in the enhanced (experimental) condition.

Participants in the control and experimental conditions were found to be equivalent in terms of demographic factors. Specifically, participants in the control or experimental condition did not significantly differ from each other in terms of age, education, time with chronic pain, amount of daily sleep, number of doctor visits or hospitalizations over the past year, or in the number of pain-related surgeries they

experienced. Additionally, control and experimental participants did not differ on baseline measures of depressive symptoms, pain perception, or strength at baseline.

There were significant mean differences between conditions on ratings of pain disability, pain related anxiety, and kinesiophobia at baseline, with means for control participants significantly greater than means for experimental participants on each measure. Each of these factors has been related to outcomes in pain treatment such as dropout (Kerns & Haythornthwaite, 1988; Richmond & Carmody, 1999), non-compliance (Turk, Rudy, & Sorkin, 1993), and unwillingness to fully engage in physical components of pain treatment (Greenberg & Burns, 2003; Lindsay & DeWilliams, 1999; Burns et al., 2000; McCracken, et al., 1993; Asmundson & Taylor, 1996). Initial differences on the study outcome measures noted above may represent selection confounds; however, as participants were randomly assigned to conditions, it is unlikely that these differences reflect a selection confound/bias.

These differences as well as other confounding variables are discussed in the study limitations section below. Overall findings provide some support for study hypotheses, and yield interesting information regarding the use of and satisfaction with somatic focusing, and other psychological techniques. The remainder of this paper will discuss implications of findings from the current study.

Study hypotheses were guided by previous research on the effectiveness/efficacy of multidisciplinary chronic pain treatment, and also by theory and research related to the influences of biopsychosocial factors on the etiology and management of chronic pain conditions. Hypothesis one predicted that all participants would experience A) a significant decrease in self-reported perceived pain intensity, B) a significant decrease in

self-reported pain disability, C) a significant decrease in pain related anxiety, D) a significant decrease in self-reported kinesiophobia, E) a self-reported decrease in self-reported depressive symptoms, and F) a significant increase in muscular strength.

Hypothesis two was related to the exploratory intervention utilized in this investigation. Hypothesis two predicted that there would be A) a significantly greater decrease in levels of self-reported pain reported by participants in the experimental condition when compared with control condition participants, B) a significantly greater decrease in levels of pain related disability reported by participants in the experimental condition when compared with control condition participants, C) a significantly greater decrease in levels of pain related anxiety reported by participants in the experimental condition when compared with control condition participants, D) a significantly greater decrease in levels of kinesiophobia reported by participants in the experimental condition when compared with control condition participants, E) a significantly greater decrease in levels of depressive symptoms reported by participants in the experimental condition when compared to control condition participants, and F) a significantly greater increase in levels of muscular strength reported by participants in the experimental condition when compared with the control condition. Related to hypothesis two, participant ratings of the use of and satisfaction/effectiveness of psychological techniques utilized during exercise groups were examined.

Although neither of the study hypotheses was fully supported, the data provided some support for each. Support for each hypothesis varied depending on the particular outcome measure that was examined. The following section will discuss findings for hypotheses one and two, and is organized by study outcome variables.

Perceived Pain Intensity

Analyses of participants self reported pain intensity as measured by the MPQ-SF (PRI) failed to fully support hypothesis 1A, which stated that all participants would experience a significant decrease in reported pain intensity over time. A non-significant main effect for time in the repeated measures ANOVA suggests that pain intensity did not significantly change over time for participants regardless of treatment condition. Measures of effect size suggest that increasing the sample size would not increase the likelihood of demonstrating a significant main effect for time. There are small differences in overall participants' mean perceived pain intensity ratings across time. That is, there was a trend for participants' scores to decrease over the course of the investigation; however this change appears to be associated with decreases in experimental participants mean scores, as control participants scores remained relatively stable throughout the investigation. This pattern of findings provides some evidence for hypothesis 1A.

The decreasing trend in participant mean scores is encouraging. Although it is possible that the overall decrease in scores is caused by individuals with higher levels of perceived pain intensity dropping out of the investigation, there were no significant mean differences at baseline for pain intensity ratings between those who completed the study and those who did not. This finding suggests that decreases in perceived pain ratings over time were not systematically caused by attrition, and to some extent, replicates consistent, positive results in the literature regarding the efficacy/effectiveness of multidisciplinary pain treatment programs in decreasing ratings of perceived pain intensity (e.g., Flor et al., 1992; Turk, 2001).

Results of statistical analyses do not fully support hypothesis 2A, which predicted a greater decrease in perceived pain intensity for individuals in the experimental condition when compared to those in the control condition. Participants in these conditions did not differ significantly with respect to perceived pain intensity as evidenced by non-significant interactions, and by a non-significant between-group main effect. A very large effect size suggests that a significant main effect for condition could emerge with a larger sample size and increased power; however, a between group difference would not necessarily provide direct support for hypothesis 2A, especially if the interaction of group by time continues to be non-significant when participants are added to the sample. The effect size for the interaction found in this analysis is quite small, and suggests that a significant group by time interaction is unlikely to be found by adding any number of participants.

The failure of the data to support the assumptions in hypothesis 2A suggests that the enhanced treatment protocol presented in this investigation does not reduce perceived pain intensity above and beyond traditional multidisciplinary treatment; however, this does not necessarily mean that the enhanced treatment is not effective and/or efficacious, and does not prevent the possibility that participation in such treatment could reduce perceived pain over a more extended time period. Examination of the enhanced treatment protocol shows that the intervention is more directly focused on ameliorating barriers to engagement in activity (e.g., depression, kinesiophobia, and pain related anxiety), and is thought to effect perceived pain intensity indirectly. For example, it is predicted that the presence of the psychologist in the exercise room increases a participant's ability to utilize psychological interventions, overcome pain related anxiety,

and fully engage in their exercise activities. Thus, it is probable that participants will benefit more directly from the exercise component of treatment, and as a result, experience a decrease in perceived pain intensity in the long run.

As previously noted there was a non-significant trend for experimental participant's mean pain intensity scores to decrease slightly over the course of the investigation. Additionally, there were no increases in participants' mean pain intensity ratings regardless of condition. These results, although not statistically significant, may suggest that the treatment provided in this investigation could assist in preventing participants' from experiencing the increased pain intensity over time. This possibility is in line with notions in recent literature, which purport that chronic pain should be managed in a manner similar to other chronic illnesses (e.g., prevention, life-long management, etc.; Turk & Okifuji, 2002).

Pain Related Disability

Analyses of participants' self-reported pain related disability as measured by the PDI provided partial support for hypothesis 1B, which stated that all participants would experience a significant decrease in reported pain related disability over time. A significant main effect for time in the repeated measures ANOVA suggests that pain related disability did significantly change over time for participants regardless of treatment condition. The results presented above support hypothesis 1B, as participants did experience a mean decrease in pain related disability overall.

Findings from analyses of pain related disability did not support hypothesis 2B. ANOVA procedures yielded a non-significant interaction for treatment condition by time, suggesting that pain disability did not decrease as a function of treatment condition

during the course of the study. As noted above, an estimate of effect size was very small and suggests that increasing sample size and power would not be likely to show a significant interaction even if one was present. There was a significant main effect for treatment condition, which indicates that there are pain related disability scores are significantly different between groups; however, mean scores were significantly different at baseline, suggesting that participants in the control condition were systematically different from experimental participants prior to treatment. Thus, significant differences between groups would not necessarily be related to a treatment, but rather to carryover of initial differences from week one to four of the study.

Pain Related Anxiety

Analyses of participants' pain related anxiety as measured by the PASS did not provide strong support for hypothesis 1C, which stated that all participants would experience a significant decrease in reported pain related anxiety over time. A non-significant main effect for time in the repeated measures ANOVA suggests that pain related anxiety did not significantly change over time for participants, regardless of treatment condition. However, related analyses found a large effect size for time. This suggests that increasing sample size and power would be likely to show a significant main effect for time if one exists. Demonstrating that pain related anxiety does significantly change over time for study participants would be consistent with results from previous investigations, which have shown that affective symptoms, including anxiety, were ameliorated by participation in multidisciplinary chronic pain treatment (e.g., Burns, Glenn, Bruehl, Harden & Lofland, 2003; Vowles & Gross, 2003), and provides additional support for continuation of the present investigation.

Hypothesis 2C, which stated that there would be a greater decrease in pain related anxiety for experimental participants when compared to control participants did not receive much support from the data. There was no significant condition by time interaction, which indicated that the overall decrease in pain-related anxiety symptoms was not significantly influenced by treatment condition over time. Further, analysis of effect size for this interaction suggests that increasing the sample size and related power would not be likely to result in a significant effect even if one was present. This finding was surprising given that experimental participants were given additional training in the application of cognitive-behavioral skills specifically aimed at reducing pain related anxiety, and that anxiety has been shown to be related to pain perception and functioning in the literature (Geisser et al, 1994; Robinson & Riley, 1999; McCracken et al., 1993; Craig, 1994).

A significant main effect for condition emerged, which suggests that there were differences between experimental and control participants with respect to reported pain related anxiety symptoms on the PASS. However, findings from independent t-tests on this variable show that control and experimental conditions were significantly different at baseline, with control participants reporting a much higher level of pain related anxiety. This suggests that any between group differences at subsequent time periods may be due initial differences rather than to differences that resulted from exposure to different levels of the independent variable (e.g., treatment condition). It is also possible that between-group variable differences are due to attrition, as there were significant differences between those who completed the study and those who did not. However, the mean scores of completers tended to decrease over time. Attrition would only be related to this

pattern, if those who dropped out of the study evidenced greater pain related anxiety scores (e.g., this would artificially lower the remaining means). In the present investigation, mean pain related anxiety scores of non-completers were significantly less than completers, suggesting that attrition was unlikely to influence changes over time, or overall between-group differences.

Although hypothesis 2C was not supported, overall changes related to hypothesis 1C are important. Specifically, the mean pain related anxiety scores of experimental and control participants tended to decrease over time, and as noted above, there was a large effect size reported for the main effect for time. Although not found to be statistically significant in this investigation, these findings provide support for the effectiveness of multidisciplinary pain treatment in reducing pain related anxiety that is clinically relevant.

Changes in level of anxiety over time are very important in the context of anxiety's role in chronic pain conditions. As previously noted, high levels of anxiety have been related to pain expectancy, reduced range of motion, physical complaints in pain patients, and prolonged pain experience (Edwards, Auguston, & Fillingim, 2003; McCracken et al., 1998; McCracken et al., 1993; Craig, 1994). These factors all have the potential to detract from quality of life, increase the need for pain treatment, decrease the likelihood of positive outcomes following treatment, and decrease motivation for using adaptive pain management strategies. These possibilities highlight the seriousness of continuing to address anxiety in chronic pain patients within the context of interdisciplinary chronic pain management interventions.

Kinesiophobia

Analyses of participants' self-reported level of kinesiophobia failed to provide support for hypotheses 1D, which stated that all participants would experience a significant decrease in reported kinesiophobia over time. The main effect for time was non-significant. However, there was a moderate effect size for time, suggesting that a larger sample and added power may lead to finding a significant effect for time if one exists.

Additionally, the data did not fully support hypothesis 2D, as the interaction for time by treatment condition was non-significant; however, given the presence of a medium to large effect size, adding to the sample size and power could potentially show a significant interaction if one is present. Although there was a significant main effect for treatment condition, there was also a significant mean difference between experimental and control participants at baseline. This suggests that control and experimental participants level of kinesiophobia differed at the beginning of the study (e.g. with control participants reporting significantly greater levels of symptoms), and that this difference remained over the duration of the project. However, observation of group means (e.g., pre and post treatment mean scores), show that experimental participants' mean kinesiophobia ratings decreased slightly, while control participants' means remained relatively unchanged. This pattern of differences seems to add some support to the possibility that a significant interaction and main effect (for time) could emerge if the study n and power of the project are increased in future research.

Depression

Analyses of participants' self-reported level of depressive symptoms as measured by the CESD failed to provide support for hypothesis 1E, which stated that all participants would experience a significant decrease in reported depressive symptoms over time, as the main effect for time was non-significant. This finding is quite unexpected, given the large body of literature which has demonstrated the efficacy/effectiveness of chronic pain treatments such as multidisciplinary pain programs (e.g., Burns, Johnson, Mahoney, Devine, & Pawl, 1998; Owens, Gatchel, Polatin, & Mayer, 1996; Jensen, Turner & Romano, 2001), and unimodal cognitive-behavioral pain group treatments (Turk & Sherman, 2002; Evers, Kraaimaat, Floris, vanRiel, & DeJong, 2002; Morley et al., 1999) in decreasing depressive symptoms. The efficacy of unimodal physical therapy and exercise in the treatment of depression in chronic pain patients is more mixed, but there is at least some support for this approach in the recent literature (e.g., Hicks, Martin, Ditor, Latimer, Craven, et al., 2003; Jentoft, Kvalik, & Mengshoel, 2001).

Project results did not fully support hypothesis 2E, which stated that there would be a greater decrease in mean levels of depressive symptomatology for experimental participants when compared to control participants. As previously stated, there was a non-significant time by condition interaction, and a non-significant main effect for condition. However, results revealed the presence of a large effect size for the interaction effect. This is very encouraging as it suggests that adding to the sample size and increasing observed power could expose a significant main effect for time should it exist. It is important to note that changes in participants' mean scores for depression were in the

expected directions, with experimental participants' means tending to decrease, and control participants' means tending to stay the same or increase slightly over the course of the study. This pattern is especially notable, as there was no significant difference between group means for depression at baseline, and a significant main effect for condition. Taken together, these results suggest that exposure to the experimental intervention may be causally related to greater changes in depression (e.g., as predicted in hypothesis 2E), and provide a basis for continued research.

Strength

As previously noted, strength was examined using participants' 8RM as measured using chest press and leg press exercises. 8RM is the product of weight lifted and number of repetitions completed, and is measured in pounds. Analyses of participants' strength were mixed. For example, analyses of participants' 8RM performance on leg press exercises failed to provide support for hypothesis 1F, which stated that all participants would experience a significant increase in strength over time, as the main effect for time was non-significant, and yielded a very small effect size. However, hypothesis 1F was supported by a significant main effect for time on the 8RM chest press measure of strength. That is, all participants became significantly stronger on this activity over the course of the investigation, regardless of assignment to treatment condition. This finding is encouraging, and adds support to existing studies, which demonstrate the efficacy/effectiveness physical therapy in increasing pain patients' muscular strength (e.g., Rooks, Silverman, & Kantrowitz, 2002; Liddle, Baxter, & Gracey, 2004). It is unclear why participants became stronger on chest press exercises, but did not demonstrate an increase in strength on leg press exercises over time. One

possibility is that more time (and additional exercise), may be necessary to increase leg strength to an observable level. Increasing the duration of the project (e.g., to include four to eight additional weeks) may be helpful in testing this prediction.

Hypothesis 2F, which stated that there would be a greater increase in mean levels of strength for experimental participants when compared to those in the control condition received less support. The main effect for treatment condition, and the interaction effect for treatment condition by time was non-significant for both 8RM leg press and 8RM chest press variables. There were non-significant, but large between-group mean differences in volume of weight lifted for both leg and chest press, with experimental means greater than those of control; however, consideration of large standard deviations and small effect sizes for interactions (for both leg and chest press) suggest that the experimental manipulation may not provide a significant advantage for increasing the strength of chronic pain patients over a six-week time period. As noted above, examination of strength variables over a longer period of time may help to clarify the impact of traditional and/or enhanced interdisciplinary treatment on pain patients' muscular strength levels.

Fidelity Measures of Cognitive-Behavioral Skills

As previously noted, cognitive-behavioral (CBT) techniques are the basis of the some of the most widely utilized and empirically supported psychological treatments for chronic pain (e.g., Keefe et al., 2002; Turk, Okifuji, Sinclair, & Starz, 1998). All of the participants in the present investigation learned and practiced CBT techniques as part of their psychoeducational groups during the first four weeks of treatment. Empirical support for the efficacy of CBT in reducing affective and physical difficulties related to

chronic pain provided the rationale for predictions stated in Hypothesis 1. The encouragement of additional use and application of CBT techniques during exercise provided the reasoning for predictions made in Hypothesis 2.

Independent samples t-tests for fidelity items yielded some interesting findings. Experimental participants reported significantly greater satisfaction with and efficacy of somatic focusing techniques than did control participants. As previously noted, experimental participants also reported nearly significant, and greater levels of use of somatic focusing during project exercise. This finding is encouraging, and suggests that experimental participants did use and perceive benefits from exposure to the enhanced treatment protocol, particularly from somatic focusing components of the treatment.

Another interesting result was a trend between experimental and control participants' dysfunctional attitudes, with control participants reporting a greater level of dysfunctional attitudes over the course of the project. Although results were non-significant, experimental participants tended to report more satisfaction with and effectiveness of cognitive techniques utilized to combat dysfunctional attitudes. Notably, experimental participants also evidenced slightly greater mean scores for use of, or satisfaction with relaxation techniques.

Given the frequency of additional exposure to cognitive behavioral techniques experienced by participants in the experimental condition, study findings of non-significant between-group mean differences for some fidelity items were not expected. It is possible that this pattern of findings is related to the unique ways in which participants utilized psychological techniques. CBT treatment protocols such as Keefe and colleagues (2002), and Caudill (2002) encourage use of the combination of interventions that works

best for the individual. It is possible that some CBT skills were not significantly different across conditions because there was so much variability in what individual participant's found helpful, and chose to utilize. For example, if a participant in the experimental condition decided that they benefited from use of somatic focusing techniques, distraction, and cognitive reframing while exercising, that participant may have used a small amount of each of these strategies as opposed to a large amount of one particular skill during their physical therapy activities. If this occurred, that participant's mean ratings for use of any one of these techniques (e.g., relaxation) may have been relatively low, and not significantly greater than that of a control participant who predominantly utilized one specific skill (e.g., relaxation) all of the time. Testing of between-group differences with a much larger sample size and increased power may help to rule out any such problems. Also, a larger sample may provide an opportunity to include fidelity variables as covariates in analyses (e.g., ANOVAs) of study predictions.

Study Limitations

Although the results of this project are encouraging, most of the support for study hypotheses 1 and 2 is related to findings from trends of participants' mean ratings, and from estimates of effect size. There are some limitations of the present investigation, which may have resulted in non-significant findings for some of the more powerful significance tests (e.g., some non-significant repeated measures ANOVA findings). Some of these limitations are confounds related to the sample, and to the internal validity of the study, and others are related to specific measurement problems.

One limitation of the present investigation was attrition. As previously noted, the investigation began with 30 participants, and ended with 18. Attrition affects the internal

validity of the investigation, and hinders the certainty with which conclusions can be drawn. In investigations of chronic pain treatment, individuals who discontinue participation may do so because they have more severe chronic pain, more fatigue, more severe affective symptoms, or possibly because they have developed more hopeless beliefs about the chronicity of their condition (e.g., the belief that treatment will never help their pain to improve). Findings can also be influenced if healthier individuals (e.g., those who are stronger, have lower levels of pain, etc) fail to complete the study. If participants with relatively more or less severe pain or other pain related symptoms drop out, then it is difficult to determine whether improvements on outcome variables are due to changes resulting from treatment, or from artificial changes in participant mean scores based attrition. Attrition can also create problems resulting from decreased sample size, and decreased power, but these problems will be discussed below. Generally, attrition is highly problematic, and it continues to be cited as a limitation of treatment studies in the area of chronic pain (Cutler, Fishbain, Cole, Steele, & Rosomoff, 2001; Townsend, 2000; Turk & Rudy, 1991).

Attempts which were made to statistically control for attrition (e.g., by examining mean values of completers versus non-completers on all dependent variables at baseline) demonstrated significant baseline differences between completers and non-completers on a number of variables, including pain related disability, pain related anxiety, and kinesiophobia. Specifically, completers evidenced significantly greater means on each of these measures. That is, participants with less disability, and less severe anxiety and kinesiophobia dropped out, and are not included in ANOVA and other statistical analyses. As noted above, having healthier participants drop out can artificially change

study results; however, in this investigation, drop out of healthier individuals means that the study sample means are artificially elevated (e.g., elevation reflects more physical or affective impairment) following baseline measurement. Participants with more severe pain related disability, pain related anxiety, and kinesiophobia have been shown to improve with multidisciplinary treatment (e.g., Vlaeyen et al., 2001; Basler et al., 1997; Soederlund & Lindberg, 2001); however, it may be more difficult to demonstrate significant effects that are more subtle (e.g., main effects or interactions with smaller effect sizes). Given that the sample in this investigation did show both significant improvements and non-significant improvements over time, it is especially likely that increasing the sample size (e.g., by adding more participants who are likely to represent a full range of physical and affective severity), may increase the likelihood of finding significant effects should they exist.

Another interpretation of the completers' greater mean pain disability, pain anxiety, and kinesiophobia scores is that these differences may suggest that a multidisciplinary program and the commitment it requires is more appealing to those who are experiencing a more intense range of symptoms and difficulties that can accompany severe chronic pain. This is somewhat counterintuitive, as participation in this program was time intensive and physically challenging (e.g., factors that could very possibly dissuade those with severe pain and its full range of complications from continuing their participation). However, it is also possible that participants' perceived intense pain and related physical and affective interference as motivation to persist in treatment. For example, an individual with severe pain may view commitment to a somewhat difficult multidisciplinary treatment regimen as worthwhile because it could decrease pain, and

some of the highly aversive biopsychosocial problems that pain can cause. Conversely, individuals who experience less severe pain and fewer related problems, may find a rigorous pain management less appealing, as they are likely to have somewhat less significant motivation to reduce their pain and related symptoms, or may do so by less demanding means (e.g., by exercising independently, taking over-the-counter medications, etc.). Interestingly, the mean pain ratings of completers and non-completers are not significantly different, but related sequelae (pain related disability, pain related anxiety, and kinesiophobia) are significantly different. It is likely that these factors are perceived to be functionally limiting, or to be particularly likely to detract from quality of life. This highlights the importance of continuing to address these factors in multidisciplinary chronic pain treatment.

A related problem is that of sample size and reduced power. Both reduced sample size and reduced power can increase the probability of type II error. The sample size utilized in this investigation is not uncommon for chronic pain treatment studies (e.g., Collins, 1999; Hawkins, 2003), which have demonstrated adequate observed power, and treatment efficacy; however, a larger sample would have been desirable for this study, and examination of estimated effect size in several non-significant ANOVA analyses were medium to quite large. This suggests that increasing the number of participants could show significant findings if they are present.

As previously noted, interpretation of study results are clouded by the high degree of variability (e.g., large standard deviations) on some dependent measures such as perceived pain intensity. Another problem that could have masked significant findings was that participants' mean scores on some variables were significantly different at

baseline. This occurred despite randomization of participants into conditions prior to the beginning of the study. As such, there is no way to completely determine whether between group differences at subsequent time periods were due to exposure to different levels of the independent variable (treatment condition), or to carryover of initial differences. Such differences were seen for statistically significant main effects for group for both pain related anxiety and kinesiophobia. As stated above, significant baseline differences decreased the clarity of possible interpretations for these results, and potentially diminished some support for hypothesis two. Problems with large standard deviations and with significant between-group differences at baseline may be ameliorated by increasing sample size and diversity, and will be discussed below.

One final study limitation related to the present sample is related to generalizability of the investigation results. For example, the sample consisted almost entirely of female Caucasian participants. Continued data collection may help to increase diversity among the sample, and this will be examined as part of future research. Notably, the decision to continue the present investigation was based on initial findings, which are considered to be encouraging, and clinically relevant.

A further limitation of the investigation may have been related to the measurement of participant ratings of cognitive-behavioral techniques on the fidelity questionnaires. As stated above, fidelity measures were highly important, as they were utilized as a manipulation check for the experimental treatment presented in this investigation. There were some positive findings in terms of significant mean differences between experimental and control participants' fidelity ratings; however, positive relationships between fidelity and outcome variables were not consistently present.

There are many explanations for this finding, but it is possible that the absence of such relationships is reflective of the measure itself.

Unlike the dependent measures utilized in this investigation, which have been shown to be reliable and valid, the fidelity measure was developed specifically for this investigation. It has not yet tested in terms of validity or reliability, and thus, it is possible that the fidelity questionnaire does not measure what it was intended to measure, or that it may not provide highly consistent measurement over time. One way to ameliorate this problem may be to add an objective measure that would allow the examiner to rate the frequency of participant use of psychological techniques during exercise. This would be somewhat difficult as some of the cognitive-behavioral techniques may not be directly observable, and also due to the subjective nature of the satisfaction/efficacy questions, but could represent an improvement in accuracy of ratings.

A larger problem with study fidelity measurement is related to the time period between participant behavior and actual measurement of this behavior. The fidelity measure relied on retrospective recall of participants' use and satisfaction ratings for cognitive-behavioral techniques for an entire week. Thus, participants' ratings may have been influenced by retrospective recall bias. Although the problem of retrospective recall bias is well documented in the literature (e.g., Stone, Schwartz, Neale, Shiffman, Marco, et al., 1998; Stone & Smyth, 2003), this problem was unavoidable, as methods of obtaining real-time data (EMA; Stone & Schiffman, 1994; see also Hufford, Shields, Shiffman, Paty, & Balabanis, 2002), which have been found to be prevent retrospective recall bias and to be appropriate for use with chronic pain patients (Stone, Briderick,

Porter, & Kaell, 1997; Cruise, Broderick, Porter, & Kaell, 1996) were not feasible (e.g., the equipment required for such data collection was not available or accessible).

Although retrospective recall bias may have hidden some actual differences in use of, or satisfaction with some cognitive-behavioral techniques, significant between-group mean differences did emerge for somatic focusing techniques. This may mean that there were particularly large between group differences in the domain of somatic focusing skills. This interpretation would provide impetus for a continued focus on somatic focusing techniques, and other cognitive-behavioral skills in multidisciplinary pain management programs. For future research it may be helpful to utilize EMA methodology, or more observational techniques (e.g., coding the number of times that a participant engaged in deep breathing, rather than relying on retrospective self-report).

It is important to remember that both the experimental protocol and measurement of psychological techniques were exploratory. The information provided from project analyses presents both encouragement of and challenges for future research. This and other study limitations and future directions for research and clinical application are discussed below.

Future Directions

Results of this investigation provide some interesting possibilities for new research and for the development of novel clinical interventions. Overall, results of this study are consistent with the efficacy/effectiveness literature in the area of chronic pain, and suggest that multidisciplinary treatment or even light multidisciplinary treatment is beneficial for chronic pain patients. Findings indicate that all participants did improve over time in terms of pain related disability and strength as measured by 8RM chest press

testing. Study findings did not fully support hypotheses 1 and 2 (e.g., there were no significant condition by time interactions, and non-significant main effects for time on outcome variables including depression, pain related anxiety, kinesiophobia, perceived pain intensity, and strength as measured by 8RM leg press testing). Failure to demonstrate significant findings could mean that participants did not benefit from either the traditional or enhanced interventions utilized in the current investigation; however, this explanation is unlikely in the context of large effect sizes described above, and given trends of participants' mean scores to change in expected directions. Also, patterns of significant correlations demonstrate strong positive relationships between variables that tend to be closely related in previous research. As previously stated, strong significant relationships between study variables provides evidence for the construct validity of the measures utilized in the investigation. Good construct validity of dependent variables along with numerous moderate to large effect sizes found in analyses of dependent variables increases the probability of detecting significant effects predicted in study hypothesis if they are present, and provides additional grounds to continue with this line of research.

More specifically, future research is needed to increase the internal and external validity of study findings, and to increase the certainty of conclusions that can be drawn from the data. The following ideas are based on the findings of the current study, and are aimed at strengthening the present methodology in order to increase power, as well as to decrease the potential limitations that could detract from the accuracy of study results.

One method of addressing limitations to the study's internal validity is to improve upon current measurement techniques in the areas of strength testing and utilization of

techniques. As noted above, it is unclear as to why participants demonstrated significant improvement in chest, but not in leg strength. These mixed results could be related in part to the frequency or nature of strength testing. This is especially likely given the strong positive association between participants' mean chest and leg strength at baseline. It may be useful to take more frequent measures of physical outcome variables, as this may increase the probability of obtaining accurate data, and could also decrease chances that any participant's mean strength level would be influenced by extraneous variables (e.g., an individual may be significantly increasing his/her strength, but this may not be demonstrated during a testing day if he/she is having particularly bad pain at that time). Similarly, more frequent measurement of demographic and fidelity measures may be helpful to prevent the potential problem of retrospective recall bias, and thus, lower the chance of type II error. As stated above, methodological techniques such as ecological momentary assessment would be very useful for this purpose.

Another way to increase the chances of obtaining more accurate measurement of changes that occur in relationship to multidisciplinary chronic pain treatment is to utilize more qualitative measurement of affective, functional, and health related changes over time. For example, findings from the present investigation may not have demonstrated statistically significant changes for all outcome variables, but small differences on outcome variables (e.g., small decreases in symptoms of anxiety, kinesiophobia, or depression) may have been clinically meaningful, and clinically significant as perceived by participants. Several recent chronic pain treatment studies have utilized qualitative methodology, and this has lead to important information in such areas as barriers to pain management (Lansbury, 2000), variation in treatment program duration (Sagula, 2000),

efficacy of group CBT (Kobus, 2000), and quality of life among chronic low back pain patients (Claiborn, Vandenburg, Krause, & Leung, 2002).

Extension of the current investigation may include qualitative analysis of areas recommended for core outcome domains in investigations of pain treatment efficacy/effectiveness by the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT; Turk, Dworkin, Allen, Bellamy, Brandenburg, et al., 2003). These domains include pain, physical functioning, emotional functioning, participant ratings of improvement and satisfaction with treatment, symptoms and adverse effects, and participant disposition. More qualitative methodology may also provide the opportunity to obtain participants' feedback regarding aspects of the traditional and experimental interventions used in the project in an effort to modify, test, and possibly improve upon existing interdisciplinary chronic pain treatments.

Another important area for future research relates to the time periods used for assessment of pain treatment effectiveness in this investigation. Specifically, it will be important to examine factors related to the project's duration. For example, the impact of treatment on some outcome measurement (e.g., pain intensity, leg strength) may not be observable within 6-week period, while other areas (e.g., depression, pain related disability) may improve during the study, but fail to remain far beyond the end of the study. As such, future research will focus on extending the present investigation to include a follow-up period. Time periods utilized for follow-up appear to be highly variable across chronic pain treatment studies, but it may be useful to continue to measure pain with multiple assessments, using the same intervals that were used in this investigation (e.g., 4 week intervals for psychosocial questionnaires, and 6-week intervals

for physical therapy/exercise testing). Also, future research may utilize multiple regression or structural equation modeling procedures to more clearly delineate relationships among treatment, fidelity, and outcome across the initial and follow-up time periods.

An additional area that is being considered for future research is related to decreasing the limitations imposed by small sample size, variability (possibly related to outliers), and to the sample's composition (e.g. mostly female and entirely Caucasian). Future research would focus on obtaining larger and more diverse samples. Diversifying the sample may pose a challenge considering that this study was conducted using a community sample, while most investigations that include large samples of chronic pain patients are conducted in settings where more diverse samples are available (e.g., chronic pain centers or clinics, interdisciplinary pain rehabilitation programs, large medical hospitals, etc.). However, it may be possible to alter recruitment strategies in a manner that greatly increases the accessibility of the project to community residents with chronic pain (e.g., by providing more flexibility in scheduling of group sessions), and in a way provides increased opportunity for participation among populations which were under-represented in the current investigation such as males, and racially or ethnically diverse individuals with chronic pain (e.g., by advertising in a wider geographic range, etc.).

In addition to the efforts to increase the internal and external validity of the project described above, future research should be clinically relevant with a focus on improvement of existing chronic pain treatments, and on continuing to develop new ways to manage chronic pain conditions. Some current literature suggests that utilizing multidisciplinary treatments, which are largely conducted in the pain patient's own

environment, are quite effective in reducing pain, related difficulties, and importantly, in reducing attrition from treatment. For example, Cott and colleagues (1990) examined the use of field management in the treatment of chronic pain. These investigators trained providers to implement interdisciplinary treatment in non-institutional settings with the goal of increasing participant's abilities to manage real environmental determinants of pain and disability (e.g., challenges at home, work, or in the participant's social environment). These authors compared their intervention with another patient group receiving office-based interdisciplinary pain treatment, and found that those who received field management experienced a significantly greater change in reduction of disability as measured by return to work, reduced limitations on work, exercise, and daily living activities. Field management participants also demonstrated significantly greater levels of treatment compliance than did the office based treatment group. Importantly, field management was found to be cost-effective. This type of intervention is similar to the notion of in-vivo treatment (e.g., applying psychological techniques in the exercise room) that was the basis for part of the experimental intervention utilized in the present study.

Future research may extend the current investigation to include a number of home visits, which utilize a more integrative approach than was used in Cott and colleagues' (1990) investigation. These visits could consist of psychologists and physical therapists working collectively to provide additional training in and application of skills (e.g., those learned during formal treatment) into the clients' environment. For example, while a pain patient is working with a physical therapist to increase their ability to climb stairs in their own home, a psychologist could show this patient how to apply cognitive strategies to situations when negative thoughts arise (e.g., if the patient can not climb as quickly as

they would like to and interpret this as a personal failure or flaw). Further, Townsend (2000) utilized a specific intervention called Minimal Contact Therapy which utilizes feedback for clients via telephone and e-mail in order to increase adherence to treatment. This type of intervention could also be added to the present investigation in order to reduce attrition. Most importantly, the interventions described above would both increase the probability that individuals with chronic pain would utilize treatment skills in their natural environment, increase the generalization of formal treatment techniques to a wider range of activities in their daily lives, and be less likely to lose treatment gains following a formal (office based) treatment program.

A final extension of the current research is related to the proposed shifting of the current conceptualization and treatment of chronic pain to be more similar to that of chronic illnesses such as diabetes. In a recent review, Turk and Okifuji (2002) state that chronic pain is often viewed in a manner that is more consistent with acute illnesses (e.g., a belief that pain will resolve following appropriate treatment, etc.). These authors emphasize pain treatment as opposed to pain cure, and suggest that individuals with chronic pain conditions are treated with continuous care models of treatment, using booster sessions, and utilizing maintenance-enhancement strategies following a comprehensive interdisciplinary pain program. The problem of not providing continual treatment was reflected by anecdotal evidence within the current investigation (e.g., group members disclosed to this author that they were disappointed that there was not a support group or other program set up following the end of the program). Considering the deleterious impact of chronic pain on the individual, families, and society in general, it seems that viewing chronic pain similarly to other chronic illnesses is an essential shift in

existing conceptualization and treatment of chronic pain conditions. For the current investigation, this could mean establishing a program which provided long-term availability of services and/or support to chronic pain patients in the community.

In conclusion, results of this investigation were somewhat consistent with the predictions included in hypotheses 1 and 2. Specifically, there was some support for the effectiveness of this multidisciplinary chronic pain treatment in participants over time in terms of significant main effects for time for pain related disability and chest strength, meaning that all participants improved over time. Additionally, there were non-significant trends toward decreased ratings of pain intensity, pain related anxiety, kinesiophobia, and depression. Further, estimates of effect size and strong levels of construct validity for study measures found in study results suggest that increasing the sample size in future research may result in exposure of significant interactions or main effects if they are present. There were moderate to large effect sizes found for the main effect for time for pain related anxiety and kinesiophobia. Also, there was a particularly large effect size found for the treatment x group interaction for depression. Again, significant findings regarding the reduction of symptoms of anxiety, kinesiophobia, and depression in future research would be extremely important, as each factor is considered to represent a barrier to chronic pain treatment. Findings related to anxiety and depression variables from the present investigation are promising.

Further, experimental participants did report higher levels of use and satisfaction for some psychological techniques which they utilized during exercise group, providing some support for the effectiveness of the experimental manipulation. Importantly, results demonstrated that experimental participants reported greater satisfaction with and

efficacy of somatic focusing skills, tended to utilize these skills more often than control participants. Experimental participants also tended to utilize greater amounts of relaxation techniques, and to report more satisfaction/efficacy for these techniques than controls. Finally, experimental participants tended to report slightly greater frequency of utilization of cognitive skills, and to experience less dysfunctional attitudes when compared to control participants. Progress in these areas may have longer term impacts as they reduce the barriers to active participation in a pain management program.

Non-significant findings related to study hypotheses may have been influenced by attrition, a high degree of variability among current participants, characteristics of the current sample, as well as by problems with measurement such as the retrospective nature of questionnaires, and by the characteristics and timing of study assessments. Greater retention of study participants may have provided a clearer picture of differences between conditions and across time. An increase in sample size and diversity may have decreased the probability of initial differences among participants, decreased the influence of potential outliers, and increased the generalizability of findings of the current investigation. Importantly, this investigation was exploratory in nature, but still demonstrated some findings that replicated previous research in demonstrating the effectiveness of light multidisciplinary chronic pain treatment.

Limitations including possible retrospective recall bias in fidelity measures, and the sensitivity of current measures to very small changes in affective or physical functioning of participants may have increased the likelihood of type II error. Use of more frequent assessment (e.g., utilizing real-time assessment methodology), different

methods of analysis (e.g., multiple regression procedures), and inclusion of a follow-up period may also lead to increased accuracy in the testing of study hypotheses.

Resolution of some of the aforementioned study limitations would increase the certainty with which conclusions could be drawn from the data, and may also provide increased support for the utilization of multidisciplinary chronic pain treatment in general as well as for the enhanced treatment protocol utilized in the present investigation.

Results of the present investigation are promising, and call for continued research with enhanced methodology and a larger sample. Findings related to the effectiveness of the novel multidisciplinary treatment utilized in this study are also important clinically, as they provide support for the continued development of increasingly collaborative multidisciplinary treatments for chronic pain conditions. Future research should be aimed at replication and extension of the present investigation, as well as at providing longer-term, highly collaborative multidisciplinary treatment to the chronic pain patient's own environment. A more accurate conceptualization of chronic pain as a chronic illness is called for in the literature, is likely to result in the best quality of care for individuals with chronic pain conditions, and should be utilized when formulating applications of the present research to clinical interventions.

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Individuals with Chronic Pain Needed to Participate in a Research Program of Multidisciplinary Pain Treatment

- We are offering a six-week multidisciplinary pain treatment program for adults (at least 18 years old) with chronic pain.
- This program includes four weeks of group psychology treatment and six weeks of group physical therapy/exercise treatment.
- This project will be conducted by members of the Department of Psychology and the Department of Physical Therapy at the University of Montana. The entire project will be conducted at the University of Montana, Missoula.
- Participation is safe and confidential.
- If you have experienced pain persistently for at least six months you may be eligible to participate in this project.
- For more information and to determine if you are eligible, please call:

243-5647

University of Montana
Department of Psychology
John Klocek, Ph.D.

ALL CONTACT WILL BE STRICTLY CONFIDENTIAL

Appendix B

Advertisement to be placed in the Kaimen:

Seeking individuals to participate in research on multidisciplinary treatment for chronic pain. We are offering a six-week pain treatment program for adults (18+) who have been experiencing persistent pain for at least six months. Participation will include four weeks of group psychotherapy and six weeks of group physical therapy/exercise. This program is being conducted by the Departments of Psychology and Physical Therapy at The University of Montana. All participation and contact is strictly confidential. To determine if you are eligible for the project and/or to obtain more information, call John Klocek, Ph.D., at 243-5647.

Appendix C

Telephone Script – Chronic Pain Study

Name	ID#	Phone #	Contact (Date, time)	Contact notes	Group (E/C)	Date and time for Initial Session	Date/Time for
PT/PSY Groups							

Remember: Confidentiality is very important. When you make a call and someone answers, make sure you are speaking to the individual involved in or wanting to participate in the study.

Use the following as an opening when you make a call:

“Hello, may I please speak to _____”

If you do not reach the individual, please give the person who you are speaking (or leave a message on the answering machine) with your name and a phone number to be reached. An example:

“Thank you, I will call back at a later time. Could you tell me when would be the best time to reach _____.”

Or

“My name is _____, calling from the University of Montana regarding a project that _____ is interested in. Please have _____ return my call at 243-5647 between the hours of _____”
(indicate time that staff will be in office). Thank you.”

If you reach the individual, use the following script

“Hello _____, my name is _____ calling from the Department of Psychology at the University of Montana. I understand that you are interested in participating in our chronic pain study. Do you have a few moments for me to tell you about the study and determine whether you are eligible?”

If NO, set a time to call them later and do so.

If YES, read the following:

This study is a 6-week program that consists of two phases and will be held at the University of Montana, Missoula. The first phase consists of psychological aspects of pain treatment and is conducted in a group format. You will also be involved in a second phase that involves physical exercise. Both phases will begin at the same time. The psychological group will meet twice a week for 6-weeks. The exercise group will meet three times a week, and will continue for 6-weeks. Each meeting for the psychology group will last approximately 1.5 hours and each meeting for the physical therapy group will last approximately 1 hour. For example, you will come to UM three times per week (Monday, Wednesday, and Friday). On each of these days you will attend physical therapy group for approximately one hour. On two of these days, Monday and Wednesday, you will also attend psychology group for 1.5 hours. In short, you can expect to

Appendix C

be at the University for about 2 to 2.5 hours on two days each week and for 1 hour on a third day each week. After the first four weeks, you will *only* attend exercise group. This means that you will only be at UM for one hour on Monday, on Wednesday, and on Friday each week for the remainder of the study.

At this time we will begin our next group on Monday July 7th. On **Monday and Wednesday exercise group** will be held from **3:30 to 4:30pm** and will be immediately followed by **psychology group**, which will last from **4:30 to 6:00pm**. On **Friday**, you will only attend **exercise group**, which will be held from **1:30-2:30pm**. There is some information that we need to ask of you before we can determine if you are eligible for this study, can I ask you these at this time?"

If the individual agrees, then ask the questions that are listed on the telephone screening form (appendix C).

If it is clear that the individual appears to meet criteria for a psychotic disorder (be careful here because some symptoms of pain – feeling something that others don't etc, can overlap with hallucinations/delusions), a substance use disorder, has uncontrolled hypertension or coronary condition, or if they do not meet one of the criteria from the General section on the screening form, they are to be considered NOT ELIGIBLE for the Study.

If there are any questions about whether they are eligible, thank them and tell them that you will call them back as soon as their eligibility has been determined. Decisions regarding questionable eligibility should be discussed with the team. By the way...remember to follow up with this and REMEMBER TO ACTUALLY CALL THEM BACK!!!

If individual does not meet criteria, then say:

"I'm sorry, but due to the information you provided, you are not eligible at this time for our study."

If individual is not interested or eligible due to any reason, then say

"There are other options available for you and I would like to give you a couple of referrals in order for you to get some assistance with your pain if you desire. These may include:

Partnership Health Care.....523-4789
St. Patrick's Hospital.....329-5843
(Center for Behavioral Medicine)

If individual meets criteria for study, then proceed to discuss the following requirements by saying the following

"It appears that you meet all the necessary criteria for this study. We will need to provide you with directions and scheduling information."

"Again, the group will be starting on Monday, July 7 and will run from 3:30 till 6:00pm on Mondays and Wednesdays, and for one hour on Fridays starting at 1:30pm".

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Participants must be able to adhere to the group schedules. For this group there is NOT an option for times. If they ask for an alternative time on any day, just say: *times of the groups are set based on our staff's schedules*. Do not offer them an option or agree that they can select particular times during the screening procedure. If someone says that they will not participate unless they are not given a particular time slot or unless they can arrive late or leave early, tell them that we will call them back soon with a response. This matter will need to be discussed with the team.

Before scheduling the participants, inform them:

“We also need to schedule an initial intake session prior to the beginning of the study in order to complete some necessary paperwork and activities as well as to familiarize you with our facilities. This first session will comprise completing informed consent, releases of information, and information questionnaires. During this session you will also receive an evaluation by a physical therapist to determine your activity readiness. You should know that the initial session should take approximately 1 hour, and you will be given some questionnaires to take home with you that will take additional time (e.g., 1-2 more hours total). *The intake session will be scheduled for either Wednesday July 2nd between 3:30pm and 5:00pm, Thursday July 3rd between 1:00pm and 3:30pm, or Monday July 7th between 1:00pm and 3:30pm.*”

If participants are eligible and can attend at one of the specified times, schedule them using the phone scheduling log. Once participants are scheduled provide the following information re: directions using the directions below.

“Now I would like to give you directions to our facility: Which side of Missoula will you be coming from?”

If coming from I-90, take the Orange Street exit. Take Orange Street heading south (toward town) and continue past the Broadway intersection and over the Orange Street Bridge. Continue on Orange Street (it will eventually turn into Stevens) until you come to the intersection of Stevens Avenue and Mount (there is a stop light at this intersection). Continue through this intersection and New Directions is on the right (across the street from the car dealerships – Subaru and Jeep), Turn right at the far end of the New Directions and you will see the entrance into the parking lot immediately on your right. Park anywhere you are able. Enter the building through either client entrance (these are marked, one on the front and one on the side of the building...all are accessible).

If coming from the south side or Hamilton, then take HWY-93 continuing on Brooks until you reach Stevens Avenue. Turn right on Stevens and continue for about a quarter mile. New Directions is on the left across the street from two car dealerships (Jeep and Subaru). If you reach the intersection of Stevens and Mount you will have gone past the New Directions Building. When you see New Directions, turn left and the parking lot will be immediately visible. Park anywhere you are able. Enter the building through either client entrance (these are marked, one on the front and one on the side of the building...all are accessible).

Once scheduling is completed and the participant understands directions, then say:

“Thank you so much for your cooperation, we will look forward to seeing you on _____
(date / time – of their **initial session**) at New Directions. If you need additional information or questions

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prior to our appointment, please call Erica Shertzer, Melody Husky, or John Klocek at 243-5647. Thanks again.”

If coming from I-90, take the Van Beuren exit to Broadway. Take Broadway to Madison St. and turn right, going over the Madison Bridge. Continue until you reach the fork and merge left (stay in the right lane after merging), taking Arthur Ave. towards the university until you reach Beckwith St (there is a stop light at this intersection). Turn left on Beckwith until you reach Mansfield Ave. Turn left on Mansfield into the parking lot. The Skaggs building is straight ahead on the left side of breezeway.

If coming from the south side or Hamilton, then take HWY-93 continuing on Brooks until you reach Beckwith Ave. Turn right on Beckwith until you reach Mansfield Ave.. Turn left on Mansfield into the parking lot. The Skaggs building is straight ahead on the left side of breezeway.

Appendix C

University of Montana Telephone Script Screening Form – Pain Group

Name: _____ Date _____ Investigator: _____

Below is a list of questions that pertain to the exclusion criteria for enrollment in the current study on chronic pain:

General

Are you 18-years of age or older? If so, age _____.

Are you able to read and comprehend written and spoken English? _____

Do you have a reliable method of transportation? _____

Are you able to attend evening sessions on Monday, Wednesday, and Friday for 12-consecutive weeks? _____

Medical

Have you been experiencing pain in one or more bodily areas over the last 6-consecutive months? If so, explain _____.

Are you currently under the care of a physician? _____.

Are you currently being treated for any of the following medical conditions?

- uncontrolled hypertension _____
- a chronic coronary condition _____

Are you currently taking prescription medication? If so, explain

Condition	Medication	Dosage	Doctor
-----------	------------	--------	--------

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Psychiatric Symptoms

1. Does it ever seem like people are talking about you or taking special notice of you? _____
2. Does it ever seem that someone is going out of their way to give you a hard time or try and hurt you? _____
3. Do you ever feel that something is very wrong with you physically, even though your doctor said nothing was wrong (like you had a terminal illness)? _____
4. Do you ever have unusual religious experiences? _____
5. Do you ever believe that others can read your mind? _____
6. Do you ever believe that your thoughts were not your own, but rather put there by someone or something else? _____
7. Do you ever feel that someone or something was controlling your thoughts or actions against your will? _____
8. Do you ever hear things that other people could not hear (noises, voices, etc.)? _____
9. Do you ever see things that others can not see? _____
10. Do you ever smell, taste, or feel things on your skin that others could not? _____
11. Do you drink alcohol? If so, how often? _____ How much per time? _____. What kind of alcohol do you drink? _____.
12. If you do not drink, do you experience withdrawal symptoms such as shaking, sweating, seizures, or hallucinations? _____
13. Does your drinking cause problems for you? _____
14. Does anyone object to your drinking? _____
15. Do you ever use illicit drugs to get high, lose weight, sleep, or change your mood? _____
16. Do you ever use prescription drugs to get high, change your mood, or for any other reason other than what the doctor prescribed? _____

Subject meets inclusion criteria? _____

Appendix D

SUBJECT INFORMATION AND CONSENT FORM

TITLE: A Novel Multidisciplinary Approach to the Treatment of Chronic Pain: A Pilot Study

Investigators/Supervisors: John W. Klocek, Ph.D.
Department of Psychology
Clinical Psychology Center 131
(406) 243-5466

James Laskin, P.T., Ph.D.
Department of Physical Therapy
Skaggs Building 025
(406) 243-4757

Co-Investigators: Erica L. Shertzer, M. A.
Department of Psychology
Skaggs Building 235
(406) 243-5647

Paul Dukarm, M. A.
Department of Psychology
Skaggs Building 235
(406) 243-5647

Special instructions to the potential subject

This consent form may contain words that are new to you. If you read any words that are not clear to you, please ask the person who gave you this form to explain them to you.

Purpose

You are being asked to take part in a research study examining the effectiveness of a new treatment approach for people with chronic pain that involves a group psychological treatment program together with a physical therapy/exercise program. The purpose of this research is to determine whether specific activities that are done within this combined treatment will be more effective than treatments for chronic pain that currently exist.

Procedures

If you agree to take part in this research study you will participate in a four-week group psychology treatment (hour long sessions on Monday, Wednesday, and Friday evenings) here at the University of Montana. These groups will teach you strategies that may help you manage your pain by making changes to your thoughts and behaviors. You will also participate in a twelve-week physical therapy/exercise program. Exercise groups will also meet on Monday, Wednesday, and Friday evenings at the University. Each group will meet for approximately one hour (e.g., you will attend one hour of group psychotherapy and one hour of physical therapy/exercise group during each evening of the study). In these groups you will engage in different physical activities that may help to increase your physical fitness and activity level.

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Groups will be directed by clinical psychology graduate students and physical therapy graduate students who are trained in the activities you will be doing. A licensed clinical psychologist and a licensed physical therapist will supervise this project.

In addition, you will be given a questionnaire packet that asks you about your pain, about some experiences you may have had, some thoughts and feelings you may have experienced, ways you may act in various situations, how you feel about your activity level and quality of life, and about yourself, your health, and treatments you have used. You will be asked to complete each questionnaire and to record your answers on the sheets provided. These questionnaires will take approximately 2-2.5 hours to complete. You will also be required to fill out these questionnaires again at four and twelve weeks after the beginning of the study. In addition, before beginning group activities, we will ask you some questions about your medical history and current health conditions.

We will also ask you to tell us to what extent you are using the information and strategies that are being presented to you in your psychology and exercise groups. We will ask you this information once per week for each week of the study. In addition, we will ask you questions regarding your overall use of and satisfaction with strategies presented in the program following the last week of the project.

Finally, we will take measurements of your physical endurance, strength, muscle tone, and body composition during some of your physical therapy/exercise group sessions. These measurements will be taken once prior to exercise group participation and then again at four, eight, and twelve weeks after the beginning of the study.

In summary, the time commitment required for participation in this project (during the next twelve weeks) is as follows:

Psychology groups:	12 Hours
Physical therapy/exercise groups:	36 Hours
Time to complete questionnaires:	11 Hours
Initial physical evaluation:	1 Hour
Physical measurements:	4 Hours

Total time for participation:	64 Hours
-------------------------------	----------

** Please note that this is an estimate of total participation time and that completion of study activities may be slightly less or more for you.

All of the meetings that you will attend will be held on the first floor of the Skaggs Building at The University of Montana and we will provide you with a form that tells you the location, date, and time of your first few groups. We ask that you maintain confidentiality regarding the presence and activities of all other project participants.

For your safety, all participants are required to obtain a release to participate in this project from a physician of your choice. Prior to participation in this study, we will ask that you complete and sign a consent form that will allow us to contact your physician to obtain their recommendation regarding your participation in this project. We will contact you with your physician's decision regarding participation as soon as possible and prior to participation in any group activities. If your physician does not recommend that you participate in this project and/or if you decide that you do not wish to participate, we have provided you with referrals for alternative treatment providers in the community (see attached handout).

Risks/Discomforts

Although we do not expect you to be harmed as a result of participating in this study, some aspects of the study may make you feel uncomfortable. Study questionnaires ask you about some experiences you may have had, some thoughts and feelings you may have experienced, about your pain, about ways you

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may act in various situations, and about your quality of life. It is possible that some of the questions may elicit uncomfortable feelings.

Engaging in physical activity is often associated with some level of discomfort as your muscles adapt to increased work. If you overwork yourself in initial exercise sessions you can experience more severe muscular discomfort. Because our outcome measures do not necessitate taking you to maximal exertion, these tests include only the discomforts associated with wearing a mask while exercising and engaging in a self-selected, self-progressed moderate exercise program.

Benefits

You may benefit from engaging in group psychotherapy and physical therapy/exercise programs. In addition, you may benefit from this study during the debriefing by learning more about the research regarding the effectiveness of pain treatment and types of treatment available for people with chronic pain.

Confidentiality

Your records will be kept private and will not be released without your consent except as required by law. Your identity will be kept confidential. If the results of this study are written in a scientific journal or presented at a scientific meeting, your name will not be used. Please note that this form and all others that contain identifying information will be stored in a locked file cabinet separate from the data. Only the study investigators will have access to the files. Although we have asked you to maintain confidentiality regarding the presence and activities of all project participants, project investigators and staff cannot guarantee that other participants will maintain this confidentiality.

Compensation for Injury

Although we believe that the risk of taking part in this study is minimal the following liability statement is required in all University of Montana consent forms. *“In the event that you are injured as a result of this research you should seek appropriate medical treatment. If the injury is caused by the negligence of the University or any of its employees, you may be entitled to reimbursement or compensation pursuant to the Comprehensive State Insurance Plan established by the Department of Administration under the authority of M.C.A., Title 2, Chapter 9. In the event of a claim for such injury, further information can be obtained from the University’s Claim Representative or University Legal Counsel (Reviewed by University Legal Counsel, July 6, 1993)”*.

Voluntary Participation/Withdrawal

Your decision to participate in this project is entirely voluntary. You may refuse to take part in or you may withdraw from the study at any time without penalty or loss of benefits to which you are normally entitled. You may leave the study for any reason.

Questions

You may wish to discuss with others before you agree to take part in this study. If you have any questions about the research now or during the study contact the any of the project investigators (listed above) at 243-4757. If you have any questions regarding your rights as a research subject, you may contact Dr. Rudbach through the Research Office at the University of Montana at 243-6670.

Subject’s Statement of Consent

I have read the above description of this research study. I have been informed of the risks and benefits involved, and all my questions have been answered to my satisfaction. Furthermore, I have been

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assured that any future questions I may have will also be answered by a member of the research team. I voluntarily agree to take part in this study. I understand I will receive a copy of this consent form.

Printed Name of Subject _____

Signature _____ Date: _____

Thank you for your time and effort. Please take a copy of this form with you.

Appendix E

**A Novel Multidisciplinary Approach to the Treatment
of Chronic Pain**

Participant Identification Form

Participant ID _____

Participant Name (print) _____

Appendix F

Consent for Release of Information

A Novel Multidisciplinary Approach to the
Treatment of Chronic Pain Project
Department of Psychology and Department of Physical Therapy
The Applied Exercise Physiology Laboratory, Skaggs Building 025
University of Montana, Missoula

Phone: (406) 243-4757

Fax: (406) 243-2795

I, _____, D.O.B. ____/____/____, S.S.N. ____/____/____
(Participant's Legal Name)

Authorize exchange of information between: Project Investigators (James Laskin, P.T., Ph.D.
and John W. Kloczek, Ph.D.), The Applied Exercise Physiology Laboratory,
Skaggs Building 025, The University of Montana, Missoula 59812.

and _____
(Physician's Name) (Address) (Phone)

The following specific information applies (check all that apply)

- I. _____ Letters and reports regarding participation in this Multidisciplinary Pain
Project
II. _____ Entire medical record

Participant's signature: _____ Date: _____

Witness: _____ Date: _____

I, the above signed understand that I may revoke this consent at any time except to the extent that
action has been taken in reliance on it.

Expiration Date: ____/____/____

(If no expiration date is indicated, consent expires at six (6) months after it is signed. Client's
consent may be up to 30 months from date of signature ARN 50-1-527).

Appendix G

Physician Release For Participation

A Novel Multidisciplinary Approach to the treatment of Chronic Pain: A Pilot Study
Department of Psychology and Department of Physical Therapy
The Applied Exercise Physiology Laboratory, Skaggs Building 025
University of Montana, Missoula

Dear Doctor:

_____ would like to participate in our research project (we have received University IRB approval) at the University of Montana. This project provides four weeks of group psychotherapy and twelve weeks of physical therapy/exercise for adult individuals with chronic pain. A component of this program requires participants to attend a physical therapy/exercise group sessions three times per week (approximately one hour per session). Exercise groups will include activities which focus on increasing flexibility, muscular strength, aerobic endurance, and functional activities. All physical activities are done under the supervision of graduate level students in the Physical Therapy Program at the University of Montana who are supervised by a licensed physical therapist (James Laskin, P.T., Ph.D., Assistant Professor of Physical Therapy, University of Montana). Based on your recommendation and after an initial physical activity screen performed by a physical therapist, your patient will begin participation on _____.

_____ I know of no reason why the person named above may not participate.

_____ I believe the person named above may participate, but use caution because:

_____ I recommend the person named above NOT participate for the following reasons:

Please specify any recommendations, limitations, or comments that project staff should be aware of: _____

Please complete this form and fax a copy to our office at 243-2795 to expedite this process. If you have any questions please feel free to contact us at 243-4757. Thank you for your time and attention.

Physician's Signature _____ Date _____

Physician's Printed or typed name _____

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DEMOGRAPHIC QUESTIONNAIRE

Today's Date _____

ID Number _____

Current employment status:

___ Employed full-time

___ Employed part-time

___ Volunteer

___ Unemployed

___ Homemaker

___ Retired

___ Retired because of pain/disability

Please circle the number of years of education that you have completed?

Grade School

High School

College

Graduate School

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+

Are you receiving compensation or disability payments now?

___ Yes ___ No

Do you have an application for compensation or disability payments pending?

___ Yes ___ No

How long ago did your current pain condition begin? _____ Years _____ Months

What caused your pain to begin? _____

Have you had any surgeries because of your pain condition? ___ Yes ___ No

If yes, how many surgeries have you had? _____

What is the average amount of sleep you get per night? _____ hours

Is your sleep disrupted by pain? ___ Yes ___ No ___ Sometimes

Please list the name of all the medications you currently take:

How many times have you gone to a doctor's office/hospital during the past year because of your pain condition?

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_____ Doctor's office

_____ Hospital

How many times have you gone to a doctor's office/hospital during the past year for reasons other than your pain condition?

_____ Doctor's office

_____ Hospital

What time of the day is your pain the worst?

___ Morning

___ Afternoon

___ Evening

___ Night

___ No typical pattern

On the line next to the treatment, please put the number that indicates how helpful (or harmful) each of the following treatments was to you. Do not put a number next to the treatments you have not tried for your pain.

1=Extremely Harmful 2=Harmful 3=Neutral 4=Helpful 5=Extremely Helpful

___ Hospital bed rest

___ Traction

___ Surgery

___ Hypnosis

___ Acupuncture

___ Nerve block or injection

___ Electrical stimulator (TENS)

___ Physical therapy

___ Exercise

___ Heat treatment

___ Biofeedback

___ Psychotherapy

___ Chiropractic

___ Relaxation techniques

___ Medications

___ Hydrotherapy (pool therapy)

___ Other (please list treatment/rating below)

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On the line next to the treatment, please put a check mark if you currently receive one of the following treatments **for your pain**. These treatments should not include services you are/will receive through this project.

<input type="checkbox"/> Hospital bed rest	<input type="checkbox"/> Traction
<input type="checkbox"/> Surgery	<input type="checkbox"/> Hypnosis
<input type="checkbox"/> Acupuncture	<input type="checkbox"/> Nerve block or injection
<input type="checkbox"/> Electrical stimulator (TENS)	<input type="checkbox"/> Physical therapy
<input type="checkbox"/> Exercise	<input type="checkbox"/> Heat treatment
<input type="checkbox"/> Biofeedback	<input type="checkbox"/> Psychotherapy
<input type="checkbox"/> Chiropractic	<input type="checkbox"/> Relaxation techniques
<input type="checkbox"/> Medications	<input type="checkbox"/> Hydrotherapy (pool therapy)

☐ Other (please list treatment/rating below)

Are you currently involved in litigation related to your pain condition?

☐ NO ☐ YES (if yes please explain on the lines below).

Have you ever been involved in litigation related to your pain condition in the past? (Not including any current legal action you disclosed in the previous item).

☐ NO ☐ YES (if yes please explain on the lines below).

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TSK

In these days of high-tech medicine, one of the most important sources of information about you is often missing from your medical records: your own feelings or intuitions about what is happening with your body. We hope that the following information will help to fill that gap.

Please answer the following questions according to the scale below each question. Please answer according to your true feelings, not according to what others think you should believe. This is not a test of medical knowledge; we want to know how you see it. Circle the number next to each question that best corresponds to how you feel.

Please answer these questions by yourself.
We want to know how you feel, not someone else.

TSK

1. Even though something is causing me a lot of pain, I don't think it's actually dangerous.

1 = strongly disagree	2 = somewhat disagree	3 = somewhat agree	4 = strongly agree
--------------------------	--------------------------	-----------------------	-----------------------

2. Just because something aggravates my pain does not mean it is dangerous.

1 = strongly disagree	2 = somewhat disagree	3 = somewhat agree	4 = strongly agree
--------------------------	--------------------------	-----------------------	-----------------------

3. People aren't taking my medical condition seriously enough.

1 = strongly disagree	2 = somewhat disagree	3 = somewhat agree	4 = strongly agree
--------------------------	--------------------------	-----------------------	-----------------------

4. My body is telling me I have something dangerously wrong.

1 = strongly disagree	2 = somewhat disagree	3 = somewhat agree	4 = strongly agree
--------------------------	--------------------------	-----------------------	-----------------------

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5. My condition has put my body at risk for the rest of my life.

1 = strongly disagree	2 = somewhat disagree	3 = somewhat agree	4 = strongly agree
--------------------------	--------------------------	-----------------------	-----------------------

6. My pain would probably be relieved if I were to exercise.

1 = strongly disagree	2 = somewhat disagree	3 = somewhat agree	4 = strongly agree
--------------------------	--------------------------	-----------------------	-----------------------

7. Although my condition is painful, I would be better off if I were physically active.

1 = strongly disagree	2 = somewhat disagree	3 = somewhat agree	4 = strongly agree
--------------------------	--------------------------	-----------------------	-----------------------

8. I am afraid that I might injure myself accidentally.

1 = strongly disagree	2 = somewhat disagree	3 = somewhat agree	4 = strongly agree
--------------------------	--------------------------	-----------------------	-----------------------

9. If I were to try to overcome it, my pain would increase.

1 = strongly disagree	2 = somewhat disagree	3 = somewhat agree	4 = strongly agree
--------------------------	--------------------------	-----------------------	-----------------------

10. Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent my pain from worsening.

1 = strongly disagree	2 = somewhat disagree	3 = somewhat agree	4 = strongly agree
--------------------------	--------------------------	-----------------------	-----------------------

11. I wouldn't have this much pain if there weren't something potentially dangerous going on in my body.

1 = strongly disagree	2 = somewhat disagree	3 = somewhat agree	4 = strongly agree
--------------------------	--------------------------	-----------------------	-----------------------

12. Pain always means I have injured my body.

1 = strongly disagree	2 = somewhat disagree	3 = somewhat agree	4 = strongly agree
--------------------------	--------------------------	-----------------------	-----------------------

13. Pain let's me know when to stop exercising so that I don't injure myself.

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1 = strongly disagree 2 = somewhat disagree 3 = somewhat agree 4 = strongly agree

14. It's really not safe for a person with a condition like mine to be physically active.

1 = strongly disagree 2 = somewhat disagree 3 = somewhat agree 4 = strongly agree

15. I'm afraid that I might injure myself if I exercise.

1 = strongly disagree 2 = somewhat disagree 3 = somewhat agree 4 = strongly agree

16. I can't do all the things normal people do because it's too easy for me to get injured.

1 = strongly disagree 2 = somewhat disagree 3 = somewhat agree 4 = strongly agree

17. No one should have to exercise when she/he is in pain.

1 = strongly disagree 2 = somewhat disagree 3 = somewhat agree 4 = strongly agree

THANK-YOU FOR TAKING THE TIME
TO ANSWER THESE QUESTIONS ABOUT YOU!

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PASS

Individuals who experience pain develop different ways to respond to that pain. We would like to know what you do and what you think about when in pain. Please use the rating scale below to indicate how often you engage in each of the following thoughts or activities. Circle any number from 0 (NEVER) to 5 (ALWAYS) for each item.

	<u>NEVER</u>					<u>ALWAYS</u>
1. I think that if my pain gets too severe, it will never decrease.....	0	1	2	3	4	5
2. My mind is calm when I am in pain.....	0	1	2	3	4	5
3. When I feel pain, I try to stay as still as possible.....	0	1	2	3	4	5
4. I become sweaty when in pain.....	0	1	2	3	4	5
5. When I feel pain, I am afraid that something terrible will happen..	0	1	2	3	4	5
6. My thoughts are agitated and keyed up as pain approaches.....	0	1	2	3	4	5
7. I go immediately to bed when I feel severe pain.....	0	1	2	3	4	5
8. Even though it hurts, I know that I'm going to be O.K.	0	1	2	3	4	5
9. My body gets shaky when I hurt.....	0	1	2	3	4	5
10. I feel disoriented and confused when I hurt.....	0	1	2	3	4	5
11. When pain gets severe, I call my doctor or go to the emergency room.....	0	1	2	3	4	5
12. I begin trembling when engaged in an activity that increases pain.....	0	1	2	3	4	5
13. When I feel pain, I become afraid of dying.....	0	1	2	3	4	5
14. I can't think straight when in pain.....	0	1	2	3	4	5
15. I will stop any activity as soon as I sense pain coming on.....	0	1	2	3	4	5
16. Even if I do an activity that causes pain, I know it will decrease later.....	0	1	2	3	4	5
17. Pain seems to cause my heart to pound or race.....	0	1	2	3	4	5
18. I think I have a serious medical problem that my physician has failed to uncover.....	0	1	2	3	4	5

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	<u>NEVER</u>	<u>ALWAYS</u>
19. As soon as pain comes on, I take medication to reduce it.....	0	1 2 3 4 5
20. I have pressure or tightness in my chest when in pain.....	0	1 2 3 4 5
21. When I feel pain I think that I might be seriously ill.....	0	1 2 3 4 5
22. During painful episodes it is difficult for me to think of anything besides the pain.....	0	1 2 3 4 5
23. I avoid important activities when I hurt.....	0	1 2 3 4 5
24. When I sense pain, I feel dizzy or faint.....	0	1 2 3 4 5
25. Pain sensations are terrifying.....	0	1 2 3 4 5
26. When I hurt, I think about the pain constantly.....	0	1 2 3 4 5
27. I take medication if I know I need to do something that usually increases pain.....	0	1 2 3 4 5
28. I have trouble catching my breath when I have pain sensations...	0	1 2 3 4 5
29. I dread feeling pain.....	0	1 2 3 4 5
30. I am bothered by unwanted thoughts when I'm in pain.....	0	1 2 3 4 5
31. If a chance comes to do something I enjoy, I do it even if it causes pain.....	0	1 2 3 4 5
32. Pain makes me nauseous.....	0	1 2 3 4 5
33. When pain comes on strong, I think that I might become paralyzed or more disabled.....	0	1 2 3 4 5
34. I find it hard to concentrate when I hurt.....	0	1 2 3 4 5
35. I seek reassurance that I am O.K. during times of more severe pain.....	0	1 2 3 4 5
36. I find it difficult to calm my body down after periods of pain.....	0	1 2 3 4 5
37. I worry when I am in pain.....	0	1 2 3 4 5
38. My stomach bothers me when I experience pain.....	0	1 2 3 4 5
39. I try to avoid activities that cause pain.....	0	1 2 3 4 5
40. I can think pretty clearly even while experiencing severe pain.....	0	1 2 3 4 5

Appendix H

MPQ-SF

Instructions: Please read each word below and decide whether it describes what your pain has felt like over the **PAST WEEK**. If a word not does describe your pain, check No (Does not apply), and go on to the next item. If a word does describe your pain, then rate how strongly you have felt that sensation according to the scale below. Remember, make these ratings as to how your pain felt over the **PAST WEEK**. When you get to page two of this form please stop and we will give you further instructions.

0 = DOES NOT APPLY 1 = MILD 2 = MODERATE 3 = SEVERE

<u>My pain felt like it was...</u>	Does Not Apply	Mild	Moderate	Severe
Throbbing	0)___	1)___	3)___	4)___
Shooting	0)___	1)___	3)___	4)___
Stabbing	0)___	1)___	3)___	4)___
Sharp	0)___	1)___	3)___	4)___
Cramping	0)___	1)___	3)___	4)___
Gnawing	0)___	1)___	3)___	4)___
Hot-Burning	0)___	1)___	3)___	4)___
Aching	0)___	1)___	3)___	4)___
Heavy	0)___	1)___	3)___	4)___
Tender	0)___	1)___	3)___	4)___
Splitting	0)___	1)___	3)___	4)___
Tiring – Exhausting	0)___	1)___	3)___	4)___
Sickening	0)___	1)___	3)___	4)___
Fearful	0)___	1)___	3)___	4)___
Punishing – Cruel	0)___	1)___	3)___	4)___

Please stop here. We will give you further instructions.

No Pain | _____ | Worst Possible Pain

PPI

0	No Pain	_____
1	Mild	_____
2	Discomforting	_____
3	Distressing	_____
4	Horrible	_____
5	Excruciating	_____

Appendix H

PDI

Instructions:

The rating scales below are designed to measure the degree to which several aspects of your life are presently disrupted by pain. We would like to know how much pain is preventing you from doing what you would normally do or from doing it as well as you normally would. Respond to each category by indicating the **overall** impact of pain on your life, not just when the pain is at its worst. For each of the seven categories listed below, please use the scale to pick the number which best describes the level of disruption you typically experience. Then circle the number in the column to the right that best describes the degree of disruption you experience.

0 1 2 3 4 5 6 7 8 9 10

no disruption mild moderate severe total disruption

1. Family/Home Responsibilities: This category refers to activities related to the home or family. It includes chores and duties performed around the house (e.g., yard work) and errands or favors for other family members (e.g., driving the children to school).	1 2 3 4 5 6 7 8 9 10
2. Recreation: This category includes hobbies, sports, and other similar leisure time activities.	1 2 3 4 5 6 7 8 9 10
3. Social Activity: This category refers to activities which involve participation with friends and acquaintances other than family members. It includes parties, theater, concerts, dining out, and other social functions.	1 2 3 4 5 6 7 8 9 10
4. Occupation: This category refers to activities that are a part of or directly related to one's job. This includes nonpaying jobs as well, such as that of housewife or volunteer worker.	1 2 3 4 5 6 7 8 9 10
5. Sexual Behavior: This category refers to the frequency and quality of one's sexual activity.	1 2 3 4 5 6 7 8 9 10
6. Self-care: This category includes activities which involve personal maintenance and independent daily living (e.g., taking a shower, driving, getting dressed, etc.)	1 2 3 4 5 6 7 8 9 10
7. Life-Supporting Activity: This category refers to basic life-supporting behaviors such as eating, sleeping, and breathing.	1 2 3 4 5 6 7 8 9 10

Appendix H

CES-D

1 = Rarely 2 = Some (1-2 days) 3 = Occasionally (3-4 days) 4 = Mostly (5-7 days)

Please circle the number which best describes how often you felt or behaved during the past week

During the past week:

1. I was bothered by things that usually don't bother me.	1	2	3	4
2. I did not feel like eating; my appetite was poor.	1	2	3	4
3. I felt that I could not shake off the blues, even with help from my family or friends.	1	2	3	4
4. I felt that I was just as good as other people.	1	2	3	4
5. I had trouble keeping my mind on what I was doing.	1	2	3	4
6. I felt depressed.	1	2	3	4
7. I felt that everything I did was an effort.	1	2	3	4
8. I felt hopeful about the future.	1	2	3	4
9. I thought my life had been a failure.	1	2	3	4
10. I felt fearful.	1	2	3	4
11. My sleep was restless.	1	2	3	4
12. I was happy.	1	2	3	4
13. I talked less than usual.	1	2	3	4
14. I felt lonely.	1	2	3	4
15. People were unfriendly.	1	2	3	4
16. I enjoyed life.	1	2	3	4
17. I had crying spells.	1	2	3	4
18. I felt sad.	1	2	3	4
19. I felt that people disliked me.	1	2	3	4
20. I could not get "going."	1	2	3	4

Reminder – Chronic Pain Treatment Group

The pain group you are scheduled to attend is meeting **Monday and Wednesday at 4:30-6:00pm (psychological) and 6:00-7:00pm (physical therapy) in the Skaggs Building Room 102 and then Skaggs building R M# 025. Friday you will attend only physical therapy group and this is from 5:30 – 6:30pm in Skaggs 025.**

It is important that you attend both sessions.

Directions: From Higgins, heading south turn left on Beckwith Drive until you reach the university. Take left on Mansfield Drive into university parking lot.

Contact **Erica Shertzer or John Klocek at 243-5647** if you have any questions or concerns regarding this program.

Reminder – Chronic Pain Treatment Group

The pain group you are scheduled to attend is meeting **Monday, Wednesday at 4:30-5:30pm (physical therapy) and 5:30-7:00pm (psychological) in the Skaggs building RM# 025 and then in the Skaggs Building RM# 111. On Fridays, you will only attend physical therapy group and this will be held in Skaggs Building rm# 025 from 4:30-5:30pm**

It is important that you attend both sessions.

Directions: From Higgins heading south turn left on Beckwith Drive until you reach the university. Take left on Mansfield Drive into university parking lot.

Contact **Erica Shertzer or John Klocek at 243-5647** if you have any questions or concerns regarding this program.

Appendix J

Please rate the following questions regarding your experiences over the past week according to the scale below

Not at all effective	moderately	very effective
(Not at all)		(Very Much)

1 2 3 4 5 6 7

1. How often did you use the relaxation techniques during physical exercise? ____
2. How effective were the relaxation techniques in improving your exercise performance? ____
3. How often did you use the distraction techniques during physical exercise? ____
4. How effective were the distraction techniques in improving your exercise performance? ____
5. How often did you use the somatic focusing techniques during physical exercise? ____
6. How effective were the somatic focusing techniques in improving your exercise performance? ____
7. How often did you experience dysfunctional thoughts / attitudes during physical exercise? ____
8. How effective were the strategies taught in group in reducing or eliminating the negative thoughts during exercise? ____

Appendix K

Please rate the following questions regarding your overall experience with the program according to the scale below

Not at all effective (Not at all)	moderately	very effective (Very Much)	
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1	2	3	4	5	6	7
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1. How effective was the psychological specialist and the strategies taught in group on enhancing your exercise sessions? _____
2. How effective do you feel the group psychotherapy sessions were in your physical rehabilitation? _____
3. How effective do you feel the group psychotherapy sessions were in improving your overall mental health? _____
4. How effective do you feel the physical therapy sessions were in your rehabilitation? _____
5. How effective was this program overall? _____
6. How effective was this program in improving your life situation? _____
7. How effective was this program in reducing the negative aspects of the chronic pain experience? _____

Please answer the questions to the best of your ability

1. What do you feel was the most helpful aspect of this program?

2. What coping strategies that were taught in group psychotherapy helped you the most?

3. What coping strategies do you plan to continue to use?

4. What coping strategies did you use before you began this program?

5. What physical therapy exercises do you feel helped you the most?

6. How often do you use each of the coping exercises on a daily basis?

-	relaxation training	_____
-	activity / rest cycles	_____
-	fighting dysfunctional attitudes	_____
-	Somatic Focusing	_____
-	Distraction	_____
7. What would you do to improve this program if you could?

Appendix L

Information Regarding the Study Titled A Novel Multidisciplinary Approach to the Treatment of Chronic Pain:

Thank you for participating in this research. The project you participated in over the last twelve weeks was intended to examine the effectiveness of a unique multidisciplinary treatment program for adults experiencing chronic pain. Specifically, this study explored the possibility that extending the roles of physical therapists and psychologists beyond what is typical in traditional multidisciplinary pain treatments might improve treatment outcomes.

Chronic pain can affect individuals physically, emotionally, and financially, and can disrupt relationships and quality of life. As pain has such a widespread impact, treatments composed of many different elements which attempt to manage pain in a variety of ways have become the standard of care. These types of treatments are called *multidisciplinary pain treatments*. Research focusing on studies involving multidisciplinary pain treatment centers found that individuals participating in such programs showed a great deal of improvement in pain intensity, pain behaviors, activity level, and use of medical services when compared to people who did not receive treatment. Two important parts of multidisciplinary treatment of chronic pain are group psychotherapy and physical therapy/exercise, which have both been found to be effective treatments for individuals with chronic pain. While each of these types of treatment addresses and reinforces the other during the course of treatment, current treatment models find physical therapists and psychologists working relatively independently.

This study compared a traditional multidisciplinary treatment program including group cognitive-behavioral therapy for chronic pain and traditional physical therapy/exercise to a novel approach to pain treatment which included traditional group psychotherapy and physical therapy; however, this new approach focused additional attention on the continued use of skills learned in each of these groups during exercise and following treatment, as well as the provision of education about exercise, soreness, and other factors associated with increased physical activity. This was done by extending the role of the psychologist into the exercise room and by extending the role of the physical therapist to the psychotherapy room.

We believe that further integration of physical therapy and psychology within multidisciplinary pain treatment is especially important because it may allow practitioners to directly address specific barriers that may prevent patients from fully engaging in traditional treatment activities and thus, benefiting from treatment. For example, factors examined in this study such as anxiety, fear of re-injury, beliefs about ability to manage pain, and depression may prevent people with pain from actively participating in physical aspects of their treatment and in physical activity in general. These barriers could potentially influence not only the benefits received from treatment, but also overall quality of life. However, the added benefits of using a more integrated multidisciplinary pain treatment program such as the one in this study have never been demonstrated.

Although we expect all participants to benefit from treatment, we expect that the modifications to traditional multidisciplinary pain treatment (by extension of the roles of psychologists and physical therapists described above) will result in lower levels of pain-related anxiety, fear of re-injury, depression, and self-reported perception of pain. In addition, we predict this treatment modification to result in increased compliance with and the effectiveness of physical exercises as measured by a decrease in resting muscle tone, improved aerobic capacity, increased muscular strength, and an increase in lean body mass when compared to the impact of traditional

Appendix L

therapy in these areas. It is also predicted that these modifications will result in increased fidelity

to the utilization of acquired skills and adaptive behavioral changes as well as an overall improvement in quality of life by the end of treatment as compared to traditional treatment.

Thank you once again for participating in this research. Should you have further questions about this research or its findings, please feel free to contact Erica Shertzer, M.A. at 243-5647.

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