PREVALENCE, RISK FACTORS AND TREATMENT OUTCOMES FOR VARIOUS MUSCULOSKELETAL INJURY SITES ASSOCIATED WITH THE DEVELOPMENT OF CHRONIC OCCUPATIONAL DISABILITY

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ABSTRACT

PREVALENCE, RISK FACTORS AND TREATMENT OUTCOMES
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The objective of this study was to identify the prevalence, risk factors and treatment outcomes for patients with various chronic disabling occupational musculoskeletal disorders (CDOMD) seeking tertiary treatment. The majority of the research available on CDOMD has focused on patients with chronic lumbar injuries. This current study evaluated patients with chronic upper extremity, cervical, lower extremity and multiple site musculoskeletal disorders in comparison to those with lumbar disorders. The participants in this study consisted of 3,492 patients entering a regional functional restoration program between the years 1997-2007. A series of univariate and multivariate statistical analyses were conducted to identify any key differences between the non-lumbar groups and the lumbar group on validated assessments covering demographic, injury-specific, psychosocial, and work-related factors. Further comparisons were made between the non-lumbar and lumbar groups with respect to socioeconomic outcomes one-year post-treatment. The general results showed that patients with non-lumbar injuries were more likely to be female and to have undergone surgery prior to admission to functional restoration rehabilitation. Patients with lumbar injuries were more likely to report higher levels of perceived disability and to develop dependency on opioid medication. The non-lumbar and lumbar groups did not differ on post-treatment socioeconomic outcomes. All patients were equally likely to return-to-work and to retain work following treatment. Furthermore, no differences were found in post-treatment healthcare-seeking behaviors or post-treatment surgeries. In conclusion, interdisciplinary treatment programs, such as functional restoration, are as successful in post-treatment socioeconomic outcomes for patients with chronic non-lumbar musculoskeletal injuries (i.e., upper extremity, cervical, lower extremity and multiple site) as they are for patients with chronic lumbar disabilities.

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CHAPTER 1

INTRODUCTION

Occupational musculoskeletal injuries are highly prevalent and costly. It is estimated that approximately $100 billion are spent annually on healthcare utilization and work productivity losses due to patients with back and neck pain conditions (Back Pain Report, 2008). Since low-back pain conditions are the most commonly cited occupational musculoskeletal injury, the majority of the research conducted on prevention and treatment of musculoskeletal disorders has focused on the lumbar regions. Recently, there has been more attention directed on the rising incidence of non-lumbar occupational injuries or disorders, in particular upper-extremity, cervical, and lower-extremity injuries. However, not much is known about the risk factors for developing chronic non-lumbar musculoskeletal disorders or about the efficacy of treatment as compared to chronic lumbar disorders.

The present paper aims to provide a comprehensive review of chronic occupational musculoskeletal disorders. Causal models help to provide insight into the various physiological and psychosocial factors that contribute to the occurrence of occupational injuries. Furthermore, to understand the progression from acute injury to chronic disability, it is essential to recognize the theories of pain, how acute pain conditions become chronic, the impact of psychopathology in the development of chronic pain conditions, and treatment protocols developed specifically for individuals with chronic occupational musculoskeletal disorders. Much is known about the risk factors for incurring occupational musculoskeletal injuries; yet, the research on the risk factors for developing chronic disabling conditions is mainly limited to lumbar injuries. Based on the current prevalence rates of both lumbar and non-lumbar occupational musculoskeletal disorders, and the propensity for these disorders to become chronic, often resulting in long-term disability, it is apparent that there is a need for continued research on the development and treatment of chronic upper-extremity, cervical and lower-extremity musculoskeletal disorders.

1.1 Causal Factors and Methods of Preventing Occupational Musculoskeletal Disorders

1.1.1 Overview of Occupational Musculoskeletal Disorders

Chronic occupational musculoskeletal disorders are highly prevalent in the working community and, not only can these injuries be debilitating to the individual, they can also be very costly for the employer and insurance companies. The study of biomechanics and ergonomics has provided a stepping stone for prevention and intervention strategies which, when upheld in the workplace, create not only safe environments for the employees, but also allow for improved productivity.

Occupational musculoskeletal injuries are thought to be caused by several factors, such as physical biomechanics, ergonomics, and psychosocial and cognitive constituents (Boocock et al., 2007; Schachter, Busch, & Peloso, 2003; Waling, Javholm, & Sundelin, 2002). Developing preventions for occupational musculoskeletal injuries can be a difficult task considering individual differences and the influence of psychosocial factors. Identification of potential risks, through screening and checklists, are necessary to evaluate possible hazards in the workplace (Buchholz, Paquet, Punnett, Lee, & Moir, 1996; David, Woods, Li, & Buckle, 2008; Hudak et al., 1996; Kitis, Celik, Aslan, & Zencir, 2009). Involving the employees in the risk assessment and intervention implementation has been identified to be advantageous not only in adherence to policy changes, but also has been shown to directly affect the employee's sense of control and purpose in the workplace, thus increasing compliance (Carrivick, Lee, & Yau, 2002; Kashima, 2003; Pehkonen et al., 2009; Robertson et al., 2009).

While prevention and intervention strategies are important to increase safety and decrease the risk of injury in the workplace, many accidents still occur. Once an individual develops an occupational musculoskeletal disorder, it is important that the appropriate treatment is sought and followed. Understanding the concept of pain and how one perceives pain is an important component to developing the appropriate treatment for the pain condition (R.J. Gatchel & Maddrey, 2004). Specifically, knowing how psychosocial factors can exacerbate the pain condition, individuals with musculoskeletal injuries must be evaluated and treated on multiple domains. This is why the biopsychosocial approach is a valuable method for assessing and treating patients with pain conditions.

Treatment options are available for individuals with occupational musculoskeletal injuries. However, the efficacy of treatment can depend on several factors, such as timeliness, insurance coverage, medication adherence and follow-through with the prescribed physical therapy (T. Mayer, 2007). While some individuals are easily treated during the acute phase, others tend to progress to a chronic condition, often resulting in physical deconditioning and psychological distress. Depending on the individual's progress, or lack thereof, more comprehensive medical and psychosocial treatment may be advisable. The main goal in treatment is to regain function and mobility. However, because psychosocial factors can impede treatment progress, those components must be considered as well. If a patient's initial injury develops into a chronic pain condition, then the treatment regimen must be tailored to meet the specific physical and psychosocial needs of the individual.

1.1.2 Causal Theories of Occupational Injuries

Recent exploration of occupational injuries has generated multiple theories aimed at identifying causal factors of workplace musculoskeletal injuries with the intent to identify appropriate preventative measures and interventions that can be put in place to decrease such injuries in the workplace. Many causal models have been created to describe the relationship between various factors in the workplace and their effects on increasing the risk for musculoskeletal injuries. While the specifics of the models vary, the overall impression is that there are many factors that can interact to create risk of injury, such as: poor ergonomic design of the workstation; high force/load on the individual; poor physical fitness; psychological distress; workplace stress; etc. By recognizing that these factors work independently and dynamically to contribute to risk, employers need to develop and adopt appropriate prevention and intervention strategies that can reduce that risk.

Armstrong *et al*. (Armstrong et al., 1993) proposed a conceptual model for the occurrence of neck and upper-extremity musculoskeletal injuries. In this model, individual characteristics, such as personality, health status, work experience, coping skills, etc., are identified as variables that directly moderate the effects of work organization on stress reactions and strain outcomes. The causal model developed by Hagberg *et al*. (Hagbert et al., 1995) focuses on prevention of occupational musculoskeletal injuries. This model describes the features of the workplace, such as an individual's posture, workstation configuration, management supervision, etc., as well as general risk factors, such as mental fatigue, inactivity, and uncomfortable temperatures, that may be directly associated with the individual's physical changes. These changes are assumed to be moderated by work factors such as duration or intensity of the activities. If the individual's capacity to handle such stress is low, the consequence is often physical injury. Much like the model proposed by Armstrong (1993), Hagbert's model views the dynamic interaction between physiological and psychosocial stresses.

An ecological model of causation of occupational upper-extremity musculoskeletal injuries was proposed by Sauter and Swanson (Sauter & Swanson, 1996). Building upon prior models that incorporated physiological and psychosocial factors, this model adds a cognitive component which is found to mediate the effects of work demands and workplace psychosocial stress on muscle tension and poor posture. Factors of this cognitive component might include the fear of losing one's job, fear of poor performance, fear of not meeting personal goals, frustration with control issues, competence and confidence issues, etc. Another feature of this model is that of a positive feedback mechanism. If an injury occurs, the psychosocial impact of that injury is found to exacerbate the symptoms, thus leading to further disability.

The Work-Style model, proposed by Feuerstein (Feuerstein, 1996), also depicts causality of occupational upper-extremity musculoskeletal disorders. Presented in this model are three work-style factors: behavioral changes; cognitive changes; and physiological changes. If these factors are determined to be altered in response to psychosocial stress, high-demand tasks, and ergonomic stressors, then the probability of incurring an upper-extremity musculoskeletal injury is thought to increase through both direct and indirect routes. Furthermore, this model shows how the interaction of psychosocial and physical stressors can intensify both the feedback mechanism and, ultimately, the injury and/or disability outcomes.

Similar to the ecological model, Carayon *et al*. (Carayon, Smith, & Haims, 1999) developed a variation that, while constructed to demonstrate workplace stress, focuses on how short-term responses affect long-term outcomes, such as occupational musculoskeletal injuries. These short-term responses are referred to as any emotional, physiological or behavioral reaction to the workplace factors, such as organization, job responsibilities, technology or the general work environment. The model assumes that the impact of individual characteristics on long-term outcomes is, in fact, moderated by these short-term responses. Furthermore, long-term responses, such as injuries, are found to invigorate these short-term responses, thus fueling the positive feedback system and leading to greater disability.

Kumar (Kumar, 2001) developed four unique theories of causal factors associated with the development of occupational musculoskeletal disorders. The first theory in this set, called the *Multivariate Interaction Theory*, involves evaluating the interactions between genetic factors, psychosocial factors, and biomechanical factors and their effects on the musculoskeletal system of the individual. The second theory, called the *Differential Fatigue Theory*, is specifically concerned with the strain of various activities on the joints and muscle tissues. If the intensity of the activity surpasses the capability of the muscles and joints, then the short-term result could be fatigue and the long-term result could be alterations in the muscle tissue and joint which could lead to a musculoskeletal injury. The third theory, called the *Cumulative Load Theory*, refers to the amount of strain the biological system can take before it loses its ability to mend itself. Continuation of increased burden on the musculoskeletal system can not only cause the joints and tissues to deteriorate, but can also lessen the capacity of those affected regions, thus often resulting in injury. The last theory, called the *Over-Exertion Theory*, implies that if the factors of physical stress, such as increased force, repetitive motion, poor posture and long duration of activities, exceed that which the joints and muscles can handle, it will, thereby, result in injury. Kumar's models of causation of occupational musculoskeletal injuries are said to run simultaneously such that any one of the factors within these models can lead to injury depending on the individual and the circumstances of the job.

While each of the theories presented define specific pathways to describe the factors that contribute to incurring an occupational musculoskeletal injury, the common element within these models is that there are dynamic interactions among the physiological, psychosocial and cognitive factors that can directly or indirectly impact the outcome. In order to develop successful protocols for prevention of occupational injuries, it is imperative that the emphasis is not only on ergonomic factors, but also that consideration should be given to psychosocial, cognitive and behavioral factors.

1.1.3 General Prevention and Intervention Strategies

It is widely accepted that occupational musculoskeletal injuries are caused by a multitude of factors, including physical biomechanics and the stresses placed upon specific body regions, ergonomics and workplace structure, and psychosocial and cognitive components. Numerous interventions have been put into place in occupational settings that are aimed at reducing occupational musculoskeletal injuries and limiting the duration of disability following an injury. The most successful interventions have been tailored to specific occupational settings, rather than "blanketed" to all areas involving a certain type of injury (i.e., low back, upper-extremity, etc.).

Interventions geared at reducing occupational musculoskeletal injuries can incorporate a global initiative or many specific components depending on the needs of the individuals within the organization. In a systematic review of interventions designed to prevent upper-extremity and neck injuries in the workplace, some of the workstation interventions that were found to be successful included having appropriate lighting, enhanced keyboards, a specialized computer mouse designed to eliminate neuropathic wrist pain, and workstation adjustment based on the ergonomic needs of the individual, such as adjustable chairs and tools that lessen vibration. (Boocock et al., 2007). Other intervention strategies aimed at preventing neck and upper-extremity injuries include various forms of exercise. Several interventions involving exercise for reducing the incidence of occupational musculoskeletal injuries have been evaluated and shown to have positive effects on the reduction of injuries and an increase in function (Boocock et al., 2007). Furthermore, many interventions have been implemented specifically to lessen the risk of low back injury in occupations involving lifting (Kim, Hayden, & Mior, 2004; Morey et al., 1999; Wesnes et al., 1997).

Another key factor for prevention and intervention of occupational musculoskeletal injuries is involving the employees in the decision-making processes. Education is an essential component in prevention and intervention programs, such that employees will learn not only how poor ergonomic workplace environments contribute to musculoskeletal distress, but also how other factors, such as sedentary work style, repetitive movements and psychosocial stress play a part in the occurrence of workplace injuries (Carrivick, Lee, & Yau, 2002; Kashima, 2003; Pehkonen et al., 2009; Robertson et al., 2009).

Identifying potential risks is essential in preventing occupational musculoskeletal injuries. However, appropriate steps must be taken in order to reduce such risks. Depending on the demand of the given occupation, appropriate ergonomic principles must be established and followed to ensure employee safety. Many methods of intervention have been identified regarding reduction of injury, but the main concepts that should be considered are: identifying areas of risk; educating the employees and supervisors of those risk factors; and creating a work environment that is conducive to eliminating such risks (Gatty, Turner, Buitendorp, & Batman, 2003). Encouraging physical activity for sedentary workers and customizing workstations to accommodate the needs of individual employees are proactive measures that contribute to the prevention of injury. Including employees as active members of the intervention team, and allowing their input in decision-making processes aimed at prevention of injuries, has also been shown to be directly related to increased safety precautions. Occupational musculoskeletal injury prevention affects both the employee and the employer. By proactively keeping the employees safe, employer costs for medical care, productivity loss and absenteeism can be substantially reduced (Gatty, Turner, Buitendorp, & Batman, 2003; Martin, Irvine, Fluharty, & Gatty, 2003; Morgan & Chow, 2007; Tompa, Dolinschi, de Oliveira, & Irvin, 2009).

1.2 Overview of Chronic Pain and Disability

Once an occupational musculoskeletal injury occurs, there is a propensity for it to become a chronic condition that can lead to extended disability. When dealing with chronic pain conditions, it is important to understand the biological mechanisms that allow for the experience of pain, the transition from an acute phase to a chronic state, and the psychosocial components that can exacerbate a condition and further hinder treatment. The following section outlines the theories of pain, the biopsychosocial model of assessment and treatment, and the prevalence of psychopathology in chronic pain populations.

1.2.1 Theories of Pain and the Biopsychosocial Model

Understanding the mechanisms associated with pain have plagued researchers for hundreds of years. The earliest theories of pain centered on the knowledge of pathophysiology and the biological factors relating pain to the elements of the nervous system. One of the initial views of pain, put forth by 17th century Rene Descartes, is termed *Cartesian Dualism*. This point of view separated the mind from the body, allowing for the conceptualization of pain solely reflecting unique processes of the sensory nervous system (R.J. Gatchel, 2005; R.J. Gatchel, Peng, Peters, Fuchs, & Turk, 2007). Furthermore, during this time, all illnesses and diseases were regarded purely as automatic biological processes, where psychosocial mechanisms were not considered as being any part of the disease state. Referred to as *Biomedical Reductionism* (R.J. Gatchel, 2004a), this theory of disease was prominent up until the latter part of the 19th century. However, in the late 1800s, distinctions within the biological understanding of the construct of pain began to prevail. In fact, two theories were put forth that focused on the true mechanism of pain perception. First, the S*pecificity Theory of Pain,* proposed by Maximillian von Frey in 1894, suggested that, within the nervous system, there were subcutaneous nerve receptors that responded to specific types of sensory input, such as temperature, touch, pressure and pain (Pearce, 2006). The second theory during this time was the *Pattern Theory of Pain*, which was proposed by Goldschneider in 1896 (Hertling & Kessler, 2006). While the *Specificity Theory of Pain* regarded the activated subcutaneous receptors to differ based on the form of sensory stimulation, the *Pattern Theory of Pain* identified the receptors to be the same; however, the varied patterns of stimulation of these receptors was said to lead to different interpretations of the sensory signals (R.J. Gatchel, 1999). This theory assumed that the stimulated nerve patterns were continuously being coded by the central nervous system.

Both the *Specified Theory* and the *Pattern Theory of Pain* have lead to recent research which has provided extensive knowledge about the different types of receptors and how stimulated nerve responses are relayed throughout the body. For example, the receptors that respond to touch or pressure are known as *mechanoreceptors*, while *thermoreceptors* are activated by changes in temperature. The receptors responsible for the perception of pain are termed nociceptors. This pain perception can vary from being sharp or prickly, burning or freezing, depending on the specified fibers stimulated, such as mechanical, thermo-mechanical, or polymodal fibers (Basbaum & Jessell, 2000).

While these previous theories still hovered around the biological mechanisms of nerve responses, the more recent findings concerning the perception of pain have focused on the integration of the mind and body. *The Gate Control Theory of Pain*, put forth by Melzack and Wall (R. Melzack & Wall, 1965), followed in the 1960s. This was the first attempt to integrate the psychosocial and physiological components into the understanding of pain (R.J. Gatchel, Peng, Peters, Fuchs, & Turk, 2007). Through the dorsal horn of the spinal cord, the substania gelatinosa is the proposed gate-control mechanism responsible for transmitting impulses from the periphery to the brain. The magnitude and severity of the signals being sent through the central nervous system is thought to be modulated by this "gating" mechanism, such that inhibitory processes can affect the transmission of signals to the brain. Higher mental processes are thought to contribute to this inhibitory mechanism, thus showing how the psychosocial component can have a direct effect on pain perception. The *Gate Control Theory* can also be viewed from a clinical point of view. When treating patients with acute or chronic pain, psychosocial factors can theoretically contribute to the perception of pain. Psychosocial distress, helplessness and anger are seen to "open" the gate resulting in an intensification of the perception of pain. However, tactics aimed at lessening psychosocial distress, such as positive coping strategies, are viewed as mechanisms that figuratively "close" the gate (R.J. Gatchel, Peng, Peters, Fuchs, & Turk, 2007).

In contrast to the prior theories of pain that focused solely on the biological processes, the Gate Control Theory was the first to incorporate physiological and psychosocial factors to present an integrated theory that combines cognition with the nervous system. In 1999, Melzack broadened this integrated system into the *Neuromatrix Model of Pain* to include stress as a major component in the understanding of pain perception (R. Melzack, 1999). According to the previous research by Selye (Selye, 1956), stress allows the body to adapt in response to physical danger. The "fight or flight" response system is activated by the hypothalamic-pituitary-adrenocortical (HPA) axis (Henderson & Baum, 2004). In response to a stressful situation, the HPA provides a negative feedback response such that the body releases cortisol to inhibit the hypothalamus from releasing corticotrophin hormone (CRH) and vasopressin. The HPA axis also provides a sympathetic response such that catecholamines (epinephrine and norepinephrine) are released as a positive feedback mechanism to increase the breakdown of adrenocorticotropic hormone (ACTH) by the pituitary gland. Prolonged stressful conditions, physical or psychosocial, can result in a hyperactive HPA system. For patients with chronic pain conditions, the hyperactive HPA response can actually exacerbate the pain experience. In fact, the increase of pain can often become a stressor itself, which continues to impair homeostasis. The Neuromatrix Theory acknowledges that individuals determine their own pain experience based on their own neuromatrix of genetics, cognitions, sensations and memories (Turk & Monarch, 2002).

Building on the gate control and neuromatrix theories, the most heuristic approach to explain how the mind and body interaction relates to the perception of pain is the *biopsychosocial model* (R.J. Gatchel, Peng, Peters, Fuchs, & Turk, 2007; Turk & Monarch, 2002). Through this perspective, physiological, psychological and social factors interact in such a way to influence the perception of pain. Unique experiences of pain depend on the individual's differences in the biological, psychological and social domains. In the medical field, Engel, in 1977, first proposed the biopsychosocial model with respect to chronic illnesses. As the disease state prolongs, the psychosocial influences are found to antagonize the condition which leads to difficulties in assessment and treatment (Freedman, 1995).

The biopsychosocial perspective was later applied to the study of pain. Differentiating between the terms *nociception* and *pain* is important to the understanding of the pain process. While nociception pertains to the biological mechanisms involved with sensory modalities, pain, on the other hand, refers to the subjective individual assessment of the sensory signals. Both, however, provide valuable information about the pain experience. S*uffering* and *pain behavior* are both related to prior experiences of pain and also to the expectation of impending events. Negative emotions affiliated with nociception and pain is termed *suffering*. Embedded within the notion of suffering are elements of psychosocial distress, such as depression, panic, anxiety and fear. The individual's behaviors associated with suffering is referred to as *pain behavior*. Oftentimes, kinesiophobia, or the fear of movement, can interfere with the treatment and the healing of pain conditions. Furthermore, certain pain behaviors can lead to prolonged disability (R.J. Gatchel, Peng, Peters, Fuchs, & Turk, 2007).

The biopsychosocial approach is not aimed at the disease, but rather is directed at the individual's illness. The distinction between the two focuses on the objectivity of the condition. A disease is a biological event that can be "cured;" however, an illness, conversely, refers to the biological, psychological and social components related to the disease that can be viewed subjectively (Turk & Monarch, 2002). Most view a chronic pain condition as an illness, since the treatment for this condition is usually approached through management of symptoms rather than an actual cure. Using the biopsychosocial approach is essential for understanding the individual pain experience because it pulls from multiple constituents (R.J. Gatchel, Peng, Peters, Fuchs, & Turk, 2007).

The biopsychosocial model is used for both the assessment and treatment of chronic pain conditions. The assessment portion identifies comorbid psychosocial variables that may hinder progress. Treatment of chronic pain conditions through the biopsychosocial method requires a multidisciplinary team of professionals that can work together to treat not only the injured site, but also to provide psychosocial therapy and to enhance social support with the employer and family.

1.2.2 Progression from Acute to Chronic Pain

All chronic pain conditions arise from acute occurrences, yet not all acute injuries result in chronic pain situations. Understanding the factors that contribute to the development of chronic pain conditions has been a primary goal in pain research. It is understood that individuals experience acute pain in relation to noxious stimuli often associated with physical injury (Basbaum & Jessell, 2000). In most cases, as the disease-state heals, the perception of pain, at this acute level, fades. Most individuals who have sustained injuries report some level of anxiety; yet, this psychosocial response is viewed as an adaptive emotion in that it promotes behaviors associated with healing, such as focusing on the injury and seeking appropriate medical care. Individuals for whom the pain state does not cease with the healing of the injury have been seen to enter an intermediate phase that can last several months following the injury. This secondary phase is marked with prolonged psychosocial distress, which can include emotions such as increased anxiety, fear or anger, and can lead to behaviors involving learned helplessness. Furthermore, during this phase secondary symptoms not associated with the injury are often reported. The increased levels of stress can be associated with other physiological disturbances, such as the respiratory and digestive systems, that qualify as somatization disorder (R. J. Gatchel, 2001).

Within six months following an injury, the natural healing process should have restored the body back to the original condition. However, some individuals continue to experience pain following the sufficient period of biological repair (R.J. Gatchel, 1991). In fact, long-term pain conditions are repeatedly found to occur in conjunction with psychosocial issues, primarily depression (R.J. Gatchel & Maddrey, 2004). Physical deconditioning often occurs with chronic pain conditions, in that exercise neglect results in the deterioration of the muscles and skeletal regions associated with the injured site (T.G. Mayer & Gatchel, 1988). Oftentimes, chronic pain patients also exhibit "deconditioning" of their psychosocial state, such that daily activities are often abandoned and personal relationships can collapse (McMahon, Gatchel, Polatin, & Mayer, 1997). Motivation can become a major factor for the chronic pain patient. Many times, individuals with chronic pain lose interest in normal responsibilities which can have direct negative effects on their family and with their work. In fact, if this lack of motivation becomes problematic with their work, patients with chronic pain can incur financial difficulties that can also contribute to their psychosocial distress. Once the individual has developed a chronic pain condition, it is essential to attend to the patient from a holistic, or biopsychosocial approach, to accommodate the biological, psychological and social needs. Because each patient's circumstances are unique, it is vital to mold the treatment to match the needs of each individual (R.J. Gatchel & Maddrey, 2004).

1.2.3 Psychopathology of Chronic Pain Patients

As previously stated, the experience of pain is affiliated with not only the biological aspects of the injured site, but also involves the inclusion of psychological and social factors. In particular, the pain experience has been found to intensify with the presence of psychopathology, which can perpetuate the individual's sense of disability. Accurately assessing the psychopathology of the patient is a fundamental component crucial for treating the chronic pain condition. Within chronic pain populations, three major psychiatric disorders prevail: mood disorders, anxiety disorders and substance use disorders. Indeed, patients experiencing chronic pain are at increased risk for depression, suicide, and sleep disorders (J. Dersh, P. Polatin, & R. Gatchel, 2002). Furthermore, as the pain experience becomes more chronic, emotional factors can exacerbate the suffering and disability (R.J. Gatchel, 1996).

Assessing psychopathology in research often involves use of the Structured Clinical Interview for Axis I DSM-IV Disorders-SCID-I, (First, Spitzer, Gibbon, & Williams, 1994) and the Structured Clinical Interview for DSM-IV Axis II Personality Disorders-SCID-II, (First, Spitzer, Gibbon, & Williams, 1994; First, Spitzer, Gibbon, Williams, & Lorna, 1994). The SCID allows for the determination of current and lifetime diagnoses of psychopathology, which are useful in determining whether the current pain episode preceded the occurrence of psychopathology or vice versa (R.J. Gatchel, 1996). Through the use of the SCID, the symptoms associated with the onset of pain can be distinguished from true psychopathology, which is necessary for the accurate treatment of chronic pain patients (R.J. Gatchel, 1991). In the general population, lifetime prevalence rates of mental disorders, as reported by the World Health Organization (R.C. Kessler et al., 2007), range from 3.3%-21.4% for Mood/Depressive Disorders and 4.8%-31.0% for Anxiety Disorders. Twelve-month, or current, prevalence rates for clinical disorders are estimated at 6.6% for Major Depressive Disorder (R.C. Kessler, Ormel, Demler, & Stang, 2003) and 18.1% for Anxiety Disorders (R.C. Kessler, Chiu, Demler, & Walters, 2005). However, within chronic pain populations, rates of psychopathology are substantially higher than in the general population. In fact, rates of Major Depression have been estimated to range between 30% - 50% (Banks & Kerns, 1996). Furthermore, patients with chronic back or neck pain have been found to be 2.8 times more likely to present with a mood disorder, and 2.2 times more likely to have an anxiety disorder (Demyttenaere et al., 2007). Substance abuse is also considered to be a DSM-IV Axis I disorder. In the general population, the 12-month prevalence rate for any substance abuse (illicit drugs or alcohol) is 8.9% and the rate for illicit drugs is only 2.8% (Substance Abuse and Mental Health Services Administration, 2009). Within chronic pain populations, the prevalence of substance abuse is much higher, ranging from 15-28% for 12-month rates (Brown, Patterson, Rounds, & Papasouliotis, 1996).

Not only have numerous studies identified the high level of comorbidity of Axis I clinical disorders and chronic pain, research has shown that depression, anxiety and substance use disorders have a direct impact on the treatment outcomes. Depression and anxiety have been linked to poor work-return rates following treatment for musculoskeletal injuries (Corbiere, Sullivan, Stanish, & Adams, 2007; Lloyd, Waghorn, & McHugh, 2008; Richmond et al., 2009; Woby, Watson, Roach, & Urmston, 2004). Substance abuse, in particular, is found to be a main risk factor in failure to return to work for patients with occupational musculoskeletal disorders (J. Dersh et al., 2007; Kidner, Mayer, & Gatchel, 2004; MacLaren, Gross, Sperry, & Boggess, 2006). Non-completion of multidisciplinary functional restoration has also been shown to hinder positive outcomes, such as work-return and work-retention following an occupational musculoskeletal injury (Proctor, Mayer, Gatchel, & Theodore, 2005). Patients who prematurely dropped-out of a functional restoration program for treatment of occupational musculoskeletal disorders were identified to present with higher rates of depressive symptoms, anxiety disorders and substance use disorders (Howard, Mayer, Theodore, & Gatchel, 2009).

Not only are there higher rates of Axis I clinical disorders in the chronic pain population as compared to the general population, but also there is also a high rate of Axis II personality disorders with chronic pain population. In fact, studies evaluating the Axis II personality disorders in chronic pain populations have found the prevalence to range from 30% up to 80% (Burton, Polatin, & Gatchel, 1997; Fishbain, Goldberg, Meagher, Steele, & Rosomoff, 1986; Reich, Rosenblatt, & Tupin, 1983; Weisberg, Gallagher, & Gorin, 1996). Personality disorders develop early, prior to adulthood, and are considered to be stable over time. Therefore, the presence of personality disorders are assumed to exist prior to the development of pain disorders (J. Dersh et al., 2007). The most common personality disorders identified in chronic pain populations are histrionic (Reich, Rosenblatt, & Tupin, 1983), narcissistic (Howard, Mayer, Theodore, & Gatchel, 2009), dependent (Fishbain, Goldberg, Meagher, Steele, & Rosomoff, 1986; Wright et al., 2004), paranoid (Polatin, Kinney, Gatchel, Lillo, & Mayer, 1993), borderline (Weisberg, Gallagher, & Gorin, 1996), avoidant (Wright et al., 2004), and obsessive-compulsive personality disorder (Wright et al., 2004). The presence of Axis II personality disorders has also been shown to interfere with treatment of patients with chronic musculoskeletal pain. Howard *et al*. (2009) showed that patients with a Cluster B personality disorder undergoing functional restoration treatment for chronic occupational musculoskeletal disorders were 1.6 times more likely to drop-out of treatment (Howard, Mayer, Theodore, & Gatchel, 2009).

The biological mechanisms associated with the pain experience represent only one component of chronic pain condition. The biopsychosocial approach to understanding the pain condition takes into account not only the physiological injury, but also how various psychosocial factors interact in a dynamic nature which can exacerbate the pain condition and often deter the progress of treatment. It is through a comprehensive evaluation, including a full assessment of psychological and social factors, that the appropriate treatment plan can be developed for the individual chronic pain patient.

1.2.4 Disability and Health Behaviors

Patients with chronic occupational injuries tend to display increased disability, which is often noted as limited function. Functional disability is affected by not only the physical condition, but also can be exacerbated by cognitive and psychosocial factors. Through the recognition and resolution of barriers that impede recovery, patients with chronic occupational musculoskeletal injuries are better able to regain function and resume normal activities, thus lessening disability behaviors (McIntosh, Melles, & Hall, 1995). Similar to the effects of psychosocial distress, disability behaviors have often been thought to hinder recovery for individuals with chronic occupational injuries. The term *disability behavior* relates to the individual's sickness role based on the perception of a benefit associated with the injury. These benefits can be seen in the workers' compensation arena as time off from work, reduced work demand, and oftentimes a financial award (R.J. Gatchel, 2004b). These benefits, also known as secondary gains, have previously been deemed as motives for intentional malingering in workers' compensation populations. However, this perception may be more of a self-fulfilling prophecy when the individual is labeled as unmotivated or treatment-resistant. Through the use of the biopsychosocial approach to manage secondary gains associated with chronic pain patients, it is often recommended to incorporate a case-manager along with vocational planning into the multimodal treatment protocol. By doing so, not only can the perception of secondary gains be reduced but, moreover, the focus can be redirected onto the reduction of secondary losses. While more emphasis is generally placed on issues of secondary gain, secondary losses can also hinder recovery in chronic occupational disorders. These losses may include: loss of financial means; work relationships; social support; recreational activities; and respect from family and friends (Fishbain, 1994). Furthermore, these losses can interfere not only with work and social/family relationships, but also can negatively affect the individual's self-esteem and level of autonomy (R.J. Gatchel, 2004b). When the barriers to treatment success go unrecognized, these secondary losses can intensify and exacerbate the chronic pain condition, thus leading to further disability.

Issues relating to secondary gain and loss can directly and indirectly impact the duration of disability and treatment success. In a study aimed at predicting the determinants associated with chronic disability, Schultz et al (Schultz et al., 2002) identified that cognitive factors were key predictors of chronic disability for individuals with occupational lumbar injuries. These cognitive factors include the perception of the individual's physical condition and the expectation of treatment success and work-related factors. Reduction of disability time and restoration of normal functional activities, such as returning to work, are seen as positive indicators of recovery and positive health behavior. Melhorn and Kennedy (Melhorn & Kennedy, 2005) identified that individuals with an extended duration of disability following an occupational injury are less likely to recover from their disability, and return to work, as compared to those who with limited absenteeism. Similarly, Howard et al (Howard, Mayer, & Gatchel, 2009) showed that individuals maintaining work following an occupational injury, sometimes with a modified schedule or demand load, were significantly more likely to return to work and to retain work post-treatment as compared to those considered full absentees following the injury.

Socioeconomic factors are also important to consider when assessing and treating patients with occupational musculoskeletal injuries. Through the identification of variants that have been known to interfere with recovery following an occupational injury, the appropriate multi-disciplinary treatment protocol can be established, which should lessen the extent of the individual's disability and lead to the re-establishment of positive health behaviors (e.g., return-to-work, decrease in healthcare utilization, etc.).

1.2.5 Primary, Secondary and Tertiary Treatment

For patients with chronic occupational musculoskeletal injuries, the optimal goal in treatment is to improve functional capacity. In doing such, the patient should not only develop greater physical strength and mobility but should also develop higher levels of self-esteem and a more positive affective state. There are three main levels of treatment available for patients with pain: primary, secondary and tertiary care. Primary care is offered to patients in an acute pain state, and the treatment protocol is aimed at alleviating the symptoms that interfere with movement and function. Because fear and anxiety are associated with pain conditions, primary care also identifies and treats these transient symptoms. Furthermore, practitioners at the primary care level should discuss issues with medication compliance and physical therapy with the patient since these elements are essential for healing (T.G. Mayer, Gatchel, Porter, & Theodore, 2006).

While most individuals with occupational musculoskeletal injuries fare well in the primary care phase, some do not progress as well and continue to experience prolonged pain and disability. Those who maintain impairment often experience more psychosocial interference which can hinder the progression of treatment. In order to deter the development of a chronic pain condition for these patients, a form of secondary care should be implemented. This phase of secondary care incorporates the main elements of primary care, but also adds a component aimed at the prevention of physical deconditioning. Through this phase, the goal is to reduce these deconditioning obstacles, often induced by psychosocial distress, which can hinder recovery (Karjalainen et al., 2004).

For some patients with musculoskeletal injuries, the primary and secondary forms of treatment are not sufficient to reduce pain and restore function. Factors that hinder progress can include poor response to physical recovery, increased psychological distress, and oftentimes legal and work-related issues that interfere with progress. For those individuals, tertiary care is often necessary.

1.2.6 Functional Restoration

A type of tertiary care that has been developed for patients with chronic pain conditions is functional restoration. Using a biopsychosocial approach to treatment, the goal of functional restoration is for the individual to avoid long-term or permanent disability. A unique team of health care professionals assesses each patient's condition and develops a treatment protocol specific to the needs of the individual. These interdisciplinary teams can include medical physicians, psychologists, psychiatrists, physical therapists, occupational therapists, biofeedback specialists, and disability case managers. The focus of this treatment regimen is to both help the individual return to his/her usual levels of function and to incorporate stress management and coping strategies such that the patient can continue to manage lifestyle issues or problems at work that can be associated with the injury (T.G. Mayer et al., 1985). Because patients entering functional restoration have been dealing with pain issues for months and even years, the likelihood of developing a dependency on their pain medications is high. In particular, opioid dependency is a common factor in patients with chronic occupational musculoskeletal disorders (J. Dersh, P. Polatin, & R. Gatchel, 2002). As part of the functional restoration treatment, patients with opioid dependency issues are further assisted with detoxification which, in the long run, is found to be beneficial in establishing positive lifestyle behaviors. The functional restoration treatment team is designed to meet regularly to discuss the progress of each patient. Modifications to the treatment regimen can be recommended when sufficient progress is delayed. Effective communication not only within the interdisciplinary team, but also with the patient, is what helps make this biopsychosocial approach so successful in treating patients with chronic pain conditions (R.J. Gatchel & Maddrey, 2004).

Research has shown that the treatment outcomes are consistently positive for patients with chronic pain conditions who successfully complete the functional restoration program. By using the biopsychosocial approach, chronic pain patients have the opportunity to increase function and mobility along with improving their psychosocial affect which together allows individuals to resume their regular, pre-injury lifestyle and activities. In addition to reporting a reduction in self-reported pain and disability, as well as improving physical functioning, the biopsychosocial approach followed in the functional restoration program has also been shown to positively affect social outcome measures, such as return to work and retaining work post-treatment (R J Gatchel & Okifuji, 2006; T.G. Mayer et al., 1987).

1.3 Prevalence and Chronicity of Occupational Musculoskeletal Disorders

With the above review of causal factors, prevention and treatment of occupational musculoskeletal injuries, we can now turn to a more comprehensive discussion of occupational musculoskeletal injuries.

1.3.1 Prevalence Rates of Occupational Musculoskeletal Injuries

The majority of workplace injuries related to musculoskeletal disorders can occur either gradually or suddenly, as in the case of an accident. For injuries involving sprain, strain or tearing of the back muscles, overexertion, falls and bodily reactions were the most commonly reported events causing such injuries. Upper-extremity injuries of the shoulder and wrist were more likely caused by overexertion or repetitive motions, and falls and overexertion were the most reported causes of lower-extremity injuries (Courtney & Webster, 2001). While overexertion was the source reported for 75.6% of all musculoskeletal disorders in 2007 (Bureau of Labor Statistics, 2007), disorders caused by falls in general were identified to be the most disabling of all musculoskeletal injuries (Courtney & Webster, 2001).

Occupational injuries are routinely reported by incidence rates and by duration of absence from work. According to the Bureau of Labor Statistics, in 2007, the overall rate of non-fatal occupational musculoskeletal injuries requiring time away from work was reported to be 35 per 10,000 full-time employees. The median days of work absence was 9, and the 27.9% of injured employees were absent from work more than 30 days. Based on specific body region affected by the occupational musculoskeletal injury, 48% were back injuries, 14.5% were upper-extremity injuries, 1.6% were cervical injuries, 8.1% were lower-extremity injuries, and 4.7% affected multiple body regions. Based on the nature of the injury, 75.3% of musculoskeletal injuries were reported as sprains or strains, 13.7% were reported as soreness or pain, and 3.6% were identified as carpel tunnel syndrome (Bureau of Labor Statistics, 2007).

The prevalence rates of musculoskeletal injuries are typically reported for specific occupations and industries. For musculoskeletal injuries of the neck, back and upper-extremity regions, the top five industries cited for the highest percentages of workers' compensation claims were air transportation, foundation and building contractors, couriers, nursing home facilities and general freight trucking companies (Bonauto, Silverstein, Adams, & Foley, 2006). In 2007, nursing aides, attendants and orderlies reported the highest rate of injury or illness at 465 per 10,000 full-time workers; while transportation and material movers with musculoskeletal injuries accounted for the greatest duration of work absence with a median of 11 days and 31.7% absent more than 30 days (Bureau of Labor Statistics, 2007).

1.3.2 Chronic Occupational Disorder Research

Because of the high prevalence and rising costs associated with low-back injuries, the lumbar region has been the primary focus in many studies evaluating risk factors and prevention and intervention strategies aimed at reducing occupational musculoskeletal disorders (Badii, Keen, Yu, & Yassi, 2006; Gatty, Turner, Buitendorp, & Batman, 2003; Martin, Irvine, Fluharty, & Gatty, 2003; Vieira & Kumar, 2006). Furthermore, research evaluating the development of chronic pain conditions is often focused on spinal/low back pain cohorts.

Many studies directed on the development of chronic lumbar disorders have used the biopsychosocial approach to identify key risk factors that specifically pinpoint elements associated with the chronicity and treatment of the lumbar musculoskeletal disorders. Age has been identified in several studies as a predictor of chronicity of lumbar disability, such that older patients are more likely to develop a chronic low back disability as compared to younger patients (R.J. Gatchel, Bernstein, Stowell, & Pransky, 2008; T. G. Mayer, Gatchel, & Evans, 2001). In fact, in a comparison of acute low back pain patients to chronic low back pain patients, Gatchel et al. (R.J. Gatchel, Bernstein, Stowell, & Pransky, 2008) identified that those with chronic conditions were more likely to be female, older, Caucasian or African American, and less likely to be married. From a physiological perspective, Ward et al. (Ward et al., 2009) identified muscular instability to be a key risk factor in the development of chronic low back pain. In a study on stationary and cyclic work related activities, Le et al. (Le, Solomonow, Zhou, Lu, & Patel, 2007), determined that an increase in the cyclic load was found to be a significant contributor associated with cumulative low back disorders. In a comparison of acute and chronic low back pain patients, Evcik and Yucel (Evcik & Yucel, 2003) evaluated range of motion and spinal mobility in a cohort of both acute and chronic low back pain patients, and they identified that patients in the chronic condition were limited on the maximum range of the lumbar extension. Furthermore, measures of pain intensity have been found to be significantly higher in chronic lumbar patients as compared to those with acute low back injuries (R.J. Gatchel, Bernstein, Stowell, & Pransky, 2008; Gheldof, Vinck, Vlaeyen, Hidding, & Crombez, 2007)

Psychosocial factors have also been found to be highly prevalent in chronic occupational lumbar disability populations. High levels of psychopathology have been shown to exist in chronic low back pain populations (J. Dersh, Gatchel, Mayer, Polatin, & Temple, 2006; J. A. Dersh, Gatchel, & Polatin, 2001; R J Gatchel, Polatin, & Mayer, 1995). In comparing acute low back pain patients to chronic low back pain patients, Gatchel et al. (R.J. Gatchel, Bernstein, Stowell, & Pransky, 2008) found that those with chronic lumbar disability were more likely to display greater depressive symptomology, were more likely to report higher levels of perceived disability, and were more likely to rate higher on the pain intensity scale. This study also identified chronic low back pain patients as being maladaptive copers. Similarly, Mercado et al (Mercado, Carroll, Cassidy, & Cote, 2005) also identified poor coping as a risk factor for the development of disabling low back conditions.

To determine the factors that lead to the chronicity of lumbar disabilities, other studies have focused on psychosocial factors. Schofferman et al. (Schofferman, Anderson, Hines, Smith, & Keane, 1993) identified that multiple childhood psychological traumas may create a predisposition to developing chronic low back pain later in life. Negative affect was found to significantly increase the incidence of long-term low back pain. However, in the same study, social support from co-workers was found to reduce that risk (Gheldof, Vinck, Vlaeyen, Hidding, & Crombez, 2007). Negative effects on everyday life and on emotional life were found to be highly prevalent in a cohort of chronic low back pain patients; in fact, in this study, 75% of the chronic low back pain patients were identified to have psychosocial disorders (Henrotin, Cedraschi, Duplon, Basin, & Duquesnoy, 2006). In a study by Wanek et al. (Wanek, Brenner, Novak, & Reime, 1998), an association was found with the development of occupational chronic low back pain and stress from work, such that prolonged exposure to work-place stressors (such as conflicts with peers or supervisors) were identified to significantly elevate the risk of developing a chronic pain condition. An interesting study by Lea et al. (Lea, Etheredge, Freeman, & Lloyd, 2003) identified a "familial disability pattern" to be a risk factor of chronic work-related spinal disabilities, such that having a primary family member with an occupational spinal disability was the greatest predictor of the development of a chronic occupational injuries. Functional limitations, along with having a history or recurrent incidence of low back pain, were the key risk factors for the development of a chronic lumbar disability. Furthermore, poor job satisfaction and job recognition were also found to be risk factors for chronicity in a study on work-related lumbar injuries (Lefevre-Colau et al., 2009).

Along with the development of chronic lumbar disability conditions, many studies have also evaluated the biological and psychosocial factors associated with treatment modalities and evidence-based outcomes for occupational lumbar disorder populations. Barnes et al. (Barnes, Smith, Gatchel, & Mayer, 1989) assessed the psychosocialeconomic factors associated with treatment outcomes in a chronic low back pain population. In this study, the leading factors associated with poor treatment outcomes included elevated scales on the Minnesota Multiphasic Personality Inventory (MMPI), higher levels of perceived disability and pain intensity ratings, and prior incidence of surgery. A follow-up study showed that chronic low back patients who successfully completed a functional restoration program were found to have a decrease in elevated scales on the MMPI from pre-treatment to post-treatment (Barnes, Gatchel, Mayer, & Barnett, 1990). Gatchel et al. (R.J. Gatchel, Mayer, & Eddington, 2006) further identified the Disability Profile on the MMPI which, in a chronic disabling spinal disorder population, is found to be highly predictive of increased psychopathology which is indicative of poor treatment outcomes. Gatchel et al. (R.J. Gatchel, Mayer, Dersh, Robinson, & Polatin, 1999) conducted a study on a chronically disabled spinal population evaluating perceived quality of life. In this study, individuals reporting greater function and less pain were identified to have successful treatment outcomes.

While there is a plethora of research evaluating chronicity and treatment outcomes for patients with chronically disabling occupational lumbar disorders, little research has focused on occupational musculoskeletal disorders not related to the lumbar region. With the increase in occupations involving sedentary work, upper extremity, cervical and lower-extremity injuries have been a major factor in work-related absences and workers' compensation claims. The current research available on upper extremity and cervical occupational injuries has focused predominately on risk factors and strategies aimed at preventing injuries (Boocock et al., 2007; Gardner, Dale, VanDillen, Franzblau, & Evanoff, 2008; Klussmann, Gebhardt, Liebers, & Rieger, 2008; Leijon, Wahlstrom, & Mulder, 2009; Nordander et al., 2008; Rempel, Tittiranonda, & Burastero, 1999). Likewise, the literature available on lower-extremity occupational disorders is limited, with the main emphasis on the predisposition of osteoarthritis of the hip and knee (D'Souza, Franzblau, & Werner, 2005).

While it seems that much is known about the development and treatment of chronic lumbar injuries, little is known about the risk factors and outcomes for individuals with upper-extremity, cervical, lower-extremity, and multiple site disorders who develop long-term disability due to the chronic pain conditions. By applying the biopsychosocial approach to the assessment and treatment of patients with chronic non-lumbar occupational disorders, and by comparing those findings to a chronic disabling lumbar population, it will be possible not only to identify the physiological, psychosocial and work-related risk factors associated with the development of the chronic non-lumbar musculoskeletal disorder, but also possible to determine if tertiary treatment, such as functional restoration, is as effective for the chronic non-lumbar group as it is for individuals with chronic lumbar musculoskeletal disorders.

1.3.3 Scope of Study

The purpose of the present study is to examine the prevalence, risk factors and treatment outcomes of patients with chronic disabling occupational musculoskeletal disorders based on the area of injury. The current study will be broken down into four separate studies: 1) Upper Extremity Injuries; 2) Cervical Injuries; 3) Lower Extremity Injuries; and 4) Multi-Site Injuries. Within each of these studies, the patients will be compared to “pure lumbar” patients to determine the differences in psychosocial risk factors and socioeconomic outcomes following treatment. While much is known about the prevalence, risk factors and treatment outcomes for patients with lumbar injuries, little research is available regarding chronic non-lumbar occupational musculoskeletal injuries. As an exploratory study, it is hypothesized that patients with different body injuries will not only vary based on physical, psychological and social factors, but also that they will exhibit differing treatment outcomes. It is the intent to compare each of the groups across three dimensions: 1) demographic and injury-specific variables; 2) work-related variables; 3) psychosocial variables. Furthermore, based a multivariate analysis will be conducted on each study to determine the key risk factors associated with each group.

CHAPTER 2

METHOD

2.1 Participants

The study consisted of a consecutive cohort of 3,492 patients presenting with a chronic disabling occupational musculoskeletal disorder (CDOMD). These patients consented to, and started, treatment at a functional restoration treatment facility -- Productive Rehabilitation Institute of Dallas for Ergonomics (PRIDE). The criteria for participation in this treatment program were: 1) the duration between date of injury and treatment is at least 3 months; 2) primary acute care and/or secondary care failed or were determined to be unnecessary; 3) surgery was either not an option or did not produce relief from the injury; 4) severe pain and functional limitations remained; and 5) must be able to communicate in English or Spanish. The participants in this study were patients discharged during the period of January, 1997 through December, 2007.

For each of the four studies, there were specific criteria for identifying the patients to be classified in each cohort. For the Upper Extremity study, the patients considered had either an upper extremity injury, affecting the shoulder, elbow, wrist or hand, or had a lumbar injury, but not both. Patients with additional injuries were not excluded from this study. The same criteria were used for the Cervical Injury study and the Lower Extremity study, such that patients were included in each of these groups regardless of other injured sites, as long as they did not have a lumbar injury.

2.2 Procedures

All participants are patients who were enrolled in a functional restoration program at PRIDE and consented to collection of information for treatment management and research purposes. The treatment program consisted of quantitatively-directed exercise progression, which was under supervision of certified physical and occupational therapists. In addition, patients participated in other activities aimed at disability management, such as counseling, stress management, biofeedback, and coping skills training. Furthermore, education support and assistance was provided for injury prevention and occupational factors (Mayer et al., 1985; Mayer et al., 1987).

At the initial interview, demographic data were collected and physical and functional capacity measurements were performed by appropriate staff members. The psychosocial instruments were administered at admission to program and at discharge. Follow-up interviews were conducted one-year post-treatment.

2.3 Measures

2.3.1 PRIDE Demographic Information Assessment

Basic demographic data on all patients admitted to PRIDE are obtained from patient records, interviews and evaluations. Variables collected included: age, gender, ethnicity, education, length of disability, number of surgeries to injured area, and injury-specific data (area of body and other comorbid body regions).

2.3.2 PRIDE Medical Case Management'st Initial Evaluation and Disability Assessment

The medical case management staff at PRIDE conducts a standardized disability assessment interview with each patient upon admission to the program. The variables collected include: type of occupation; physical demands; length of employment at the job of injury; pre-injury net wages; weekly disability payments; work history; current work status; pre-treatment case settlement; and legal representation status. An additional interview is conducted after treatment begins, which assesses the patient's relationship with his/her employer, desire to return to work with same employer, and desire to return to same type of work.

2.3.3 Pain Intensity Analog

The participant is asked to rate the severity of his/her pain along an unmarked 10cm line. Utilizing deciles, the cut-off points for interpretation of this score are as follows: less than four indicates “mild pain;” four to six indicates “moderate pain;” and scores of at least seven indicate “severe pain.”

2.3.4 Million Visual Analog Scale (MVAS)

The MVAS is a self-report instrument measuring pain perception and subjective disability. It was originally developed by Million, Hall, Haavik-Nilsen, Jayson and Baker (1981) with modifications to cut-offs developed by Anagnostis, Mayer, Gatchel and Proctor (2003). The MVAS is a 15 question assessment for which each response is indicated as a point on a line marked in increments from 0 to 10. The sum of the 15 responses determines the final score on this assessment, such that: 0 = no disability; 1-40 = mild disability; 41-70 = moderate disability; 71-100 = severe disability; 101-130 = very severe disability; and 131-150 = extreme disability.

2.3.5 Pain Disability Questionnaire (PDQ)

The Pain Disability Questionnaire (PDQ) was used to measure perceived disability (Anagnostis, Gatchel, & Mayer, 2004). This assessment is based on 15 statements, each measured on an 11-point visual analog scale, with each scale ranging from 0 to 10. The PDQ is divided into a functional component and a psychosocial component. The functional portion of the assessment ranges from 0 to 90 and the psychosocial portion ranges from 0 to 60. The total score ranges from 0 to 150, with the lower scores representing the least amount of perceived disability. Total scores ranging from 0-70 represent mild/moderate disability, 71-100 represent severe disability, and 101-150 represent extreme disability.

2.3.6 Beck Depression Inventory (BDI)

The BDI is a self-report measure which consists of 21 questions related to physical and emotional symptoms of depression (Beck, Ward, Mendelson, Mock & Erbaugh, 1961). The responses to each question range in points from 0 to 3, and the sum of the 21 responses determines the final score on this assessment, such that: 0-9 = no depression; 10-18 = mild to moderate depression; 19-29 = moderate to severe depression; and scores greater than 29 = severe depression.

2.3.7 Short-Form Health Evaluation (SF-36)

To evaluate quality of live, the Short-Form (36) Health Survey provides measures on the following domains: Vitality, Physical Functioning, Bodily Pain, General Health Perceptions, Physical Role Functioning, Emotional Role Functioning, Social Role Functioning, and Mental Health.(Hays, Sherbourne, & Mazel, 1993) The SF-36 also provides a composite score for a Mental Health Summary and a Physical Health Summary. The scores on the SF-36 range from 0 to 100 with the higher score representing optimal functioning and the scores are standardized with the mean score of 50.

2.3.8 Minnesota Multiphasic Personality Inventory 2nd edition (MMPI-2)

The MMPI-2 is a self-report questionnaire containing 567 items which provide information on psychiatric symptoms and personality style (Hathaway & McGinley, 1942). The questions are partitioned into 10 different scales such that elevation of particular scales or combinations of scales allow for various interpretations. The specific profiles considered in this analysis are the Normal Profile and the Disability Profile.

2.3.9 Structured Clinical Interview for DSM-IV (SCID-NP and SCID-II)

The SCID-NP (First, Spitzer, Gibbon & Williams, 1995) is a structured interview that yields Axis I diagnoses that correspond with the DSM-IV criteria. The diagnoses considered in this study include Major Depressive Disorder, Generalized Anxiety Disorder and Substance Use Disorders. The SCID-II (First, Gibbon, Spitzer, Williams & Benjamin, 1997) is also a structured interview that identifies Axis II Personality Disorders defined with the DSM-IV criteria. The diagnoses provided by the SCID-II allow for individual personality disorders to be categorized into three clusters: Cluster A (odd, eccentric and suspicious individuals); Cluster B (dramatic, emotional and erratic individuals); and Cluster C (anxious and fearful individuals) (DSM-IV, 1994).

2.3.10 PRIDE One-Year Follow-up Evaluation

The variables assessed one-year post-treatment telephone interview include whether the patient returned to work at any time within that year and whether the patient is currently working. Treatment seeking behaviors, post-treatment surgeries and workers' compensation case settlement factors are also assessed.

2.4 Statistical Analyses

2.4.1 Single-Variable Comparisons

For all of the comparisons (in each of the four studies), single-variable analyses was conducted that controlled for age, gender and ethnicity. In doing such, a hierarchical logistic regression was used with the demographic factors entered into the first block followed by the variable being considered. A binary logistic regression analysis was used to determine the differences between the specified group and the pure lumbar group. The significance criterion for the variables in each study was determined based on the Holm-Bonferroni Step-Down approach.

2.4.2 Multivariate Comparisons

For each of the four studies, a multivariate binary logistic regression analysis was used to determine the key variables associated with each group being compared. The variables being considered for the logistic regression model for each study were based on those found significant at the single-variable level. The first block controlled for age, gender and ethnicity. The injury-specific variables and the occupational variables were added in block two. The third block included the self-report physical and psychological variables. And finally, the fourth block assessed any significant Axis I or Axis II diagnoses. A Pearson chi-square statistic was assessed following the addition of each block in the sequential logistic regression model to evaluate the association of each set of variables with group placement. The significance criterion for the logistic regression analysis was set at $\alpha = .05$.

Finally, a comprehensive simultaneous multinomial logistic regression model was developed to assess the association of the independent variables (risk factors and socioeconomic outcomes) with the three primary groups: Pure Upper Extremity, Pure Cervical Spine and Pure Lower Extremity Injuries as compared to Pure Lumbar Injuries.

CHAPTER 3

RESULTS

All appropriate data screening was conducted to identify possible outliers, to evaluate skewness and to ensure homogeneity of variance. For variables with missing data or values outside the accepted range, the participant was excluded from the univariate and the subsequent multivariate analysis utilizing that particular variable. Appendix A contains all of the tables describing the statistical comparisons in these studies. Tables A58 through A65 show an overview of the univariate comparisons of all four groups. Tables A1 through A35 detail the univariate comparisons for each injury group. These comparisons include the risk factor evaluations and the one-year socioeconomic outcomes. Tables A36 through A57 detail the multivariate comparisons. Due to the number of multiple comparisons in this study, a Holm-Bonferroni Step-Down method was used to correct for any potential Type I errors at the univariate level.

3.1 Upper Extremity Injuries

For the Upper Extremity portion of this study, a total of 2,484 patients were included. Patients with upper extremity injuries represented one-third of the cohort (N = 811) and were compared to the patients with lumbar injuries (N = 1,673). Table B1 lists the specific diagnoses for the patients with upper extremity injuries. The single-variable comparisons are represented in Tables A1-A10 and the multivariate analyses for the Upper Extremity comparisons are represented in Tables A36 – A39. Patients with upper extremity injuries differed from those with lumbar injuries on gender, such that males were 2.9 times more likely to have a lumbar injury as compared to females (see Table A1). There was a marginal difference in ethnicity identified between the upper extremity and lumbar groups; however, after the Holm-Bonferonni adjustment was applied, the differences in ethnicity became non-significant.

The single-variable comparisons were conducted both with and without controlling for the demographic variables: age, gender and ethnicity. For the injury-specific variable comparisons, the patients with upper extremity injuries were 1.3 times more likely to complete the functional restoration program ($X2 = 5.072$, $p = .024$) and were 3.3 times more likely to have undergone a surgery prior to admission for treatment ($X2 = 158.32$, $p < .001$). Furthermore, patients with upper extremity injuries presented with a greater mean number of compensable body parts as compared to the lumbar group (see Table A2). Patients in the lumbar group, on the other hand, exhibited a greater length of disability and a greater duration of total disability.

The comparisons of the psychosocial variables for the Upper Extremity study are presented in Table A3. As compared to the lumbar group, those with upper extremity injuries indicated lower levels of psychosocial distress. On the Beck Depression Inventory, patients with upper extremity injuries reported significantly lower levels of depression symptomotology ($X2 = 16.216$, $p < .001$). The upper extremity patients also displayed lower levels of pain, as measured on the Pain Intensity Analog scale ($X2 = 15.025$, $p <.001$). Perceived disability, as measured by the Million Visual Analog Scale and the Pain Disability Questionnaire, was found to be higher for the lumbar group as compared to the upper extremity group (MVAS $X2 = 226.46$, $p < .001$; PDQ $X2 = 38.508$, $p < .001$). On the Short-Form 36 Health Inventory, there were no differences between the two groups on the Mental Health Composite scores; however, the patients with upper extremity injuries represented higher scores on the Physical Composite Summary ($X2 = 53.677$, $p <.001$), indicating greater perceived quality of life for physical function as compared to those with lumbar injuries.

While there were significant differences found between the groups in relation to psychosocial distress, the rates of Axis I and Axis II DSM-IV psychopathology did not vary between the two groups (see Tables A4-A5). The only exception was with the Axis I Substance Use and Opioid Dependence diagnoses, such that patients with lumbar injuries were 1.7 times more likely to be diagnosed with a Substance Use disorder ($X2 = 18.215$, $p < .001$) and were 1.9 times more likely to be diagnosed with Opioid Dependence ($X2 = 20.963$, $p < .001$).

Likewise, as shown in Table A6, patients with lumbar injuries were found to be 1.4 times more likely to exhibit a Disability Profile on the MMPI as compared to the upper extremity groups ($X2 = 6.781$, $p = .009$).

In comparing the work related variables for the patients with upper extremity and lumbar injuries, there were no differences found between the groups for job availability, working at admission to treatment or on job satisfaction (see Table A7). However, there was a significant difference on the level of job demand, such that patients with medium to very heavy lifting demands were 1.5 times more likely to develop chronic lumbar disabilities as compared to upper extremity injuries. The type of work (blue collar vs. white collar) varied significantly between the two comparison groups without controlling for the demographics; however, once age, gender and ethnicity were controlled, there were no identifiable differences in the job code.

For the one-year socioeconomic outcomes, only the data of the patients that completed the functional restoration program were analyzed, as seen in Table A8. It was hypothesized that the patients with more severe injuries would have poorer treatment outcomes; however, there were no significant differences found between the patients with upper extremity injuries and those with lumbar injuries on post-treatment work return and work retention. The percentage of patients exhibiting healthcare-seeking behaviors post-treatment was higher for the lumbar group; however, with the multiple comparison adjustment, this difference in this variable was no longer significant. Post-treatment surgery to the original injury site did not vary between the two groups. Lastly, while case settlement was very high for both groups, patients with upper extremity injuries were 2.3 times more likely to have settled their workers' compensation cases ($X2 = 8.562$, $p = .003$) in relation to the lumbar group.

Two sub-analyses were conducted to compare the types of injuries within the Upper Extremity cohort. The first sub-analyses focused on injuries that were either neuropathic or non-neuropathic in nature. As seen in Table A9, the one-year socioeconomic outcomes did not differ between the neuropathic and non-neuropathic subgroups. Another sub-analysis was conducted to compare the area of injury for the patients in the Upper Extremity group (see

Table A10). This second sub-analysis compared those with shoulder, elbow, wrist and hand injuries. There were no differences found in the one-year socioeconomic outcomes based on the area of injury for the Upper Extremity group.

A sequential multivariate logistic regression analysis was conducted to determine the key risk factors associated with the upper extremity group in contrast to the lumbar group (see Tables A36 through A39). The first three blocks contained the demographic, injury-specific/occupation variables and the psychosocial variables. The addition of each of these blocks to the model was significant. However, Block 4, containing the DSM-IV Axis I and Axis II disorders, did not significantly contribute to the predictive model. The variables that were found to be significantly associated with upper extremity injuries in the final model (see Table A39) included being female, undergoing surgery prior to treatment, sustaining more compensable body injuries, and having higher quality of life indicators for physical function on the SF-36. The greater the length of disability and the higher the ratings of perceived disability on the Million Visual Analog scale were significantly related to lumbar injuries. For the final model identifying the risk factors for developing chronic upper extremity disability compared to developing lumbar disability, the Nagelkerke R^2 was 0.380.

3.2 Cervical Spine Injuries

For the Cervical Spine portion of this study, a total of 2,495 patients were included. Patients with cervical injuries represented approximately twenty percent of the cohort (N = 523) and were compared to the patients with lumbar injuries (N = 1,972). The specific cervical diagnoses are listed in Table B2. The single-variable comparisons are represented in Tables A11-A18 and the multivariate analyses for the Cervical Spine comparisons are represented in Tables A40 – A43. As shown in Table A11, the patients with Cervical injuries differed significantly from those with lumbar injuries on both gender and age. Males were found to be 1.9 times more likely to have a lumbar injury as compared to cervical injuries ($X2 = 46.007$, $p < .001$). While patients with cervical injuries were identified to be slightly older than those with lumbar injuries, the effect size was small ($t = 3.137$, $p = .002$, Cohen's $d = 0.15$). After applying the Holm-Bonferroni correction, differences in ethnicity were not significant.

The demographic variables (age, gender and ethnicity) were controlled for in the single-variable comparisons. In comparing the injury-specific variables (see Table A12), there were no differences found between the cervical injury group and the lumbar injury group on completion rate, length of disability, duration of total disability, attorney retention or case settlement. Patients with cervical injuries were found to be 1.4 times more likely to have undergone surgery prior to treatment ($X2 = 12.262$, $p <.001$); and likewise, the cervical injury patients reported significantly greater compensable body parts as compared to the lumbar injury group ($X2 = 207.93$, $p < .001$).

In comparing the psychosocial factors (see Table A13), there were few differences found between the patients with cervical injuries and those with lumbar injuries. No differences were found on the Beck Depression Inventory, the Pain Intensity Analog Scale, the Pain Disability Questionnaire or on the Mental Health Summary of the Short-Form (36) Health Inventory. Patients with lumbar injuries did report higher levels of perceived disability on the Million Visual Analog Scale as compared to those with cervical injuries ($X2 = 33.772$, $p < .001$). Likewise, patients with lumbar injuries indicated poorer quality of life on the Physical Health Summary of the Short-Form (36) Health Inventory ($X2 = 8.421$, $p = .004$).

As shown in Table A14, there were moderate differences between the patients with cervical injuries and those with lumbar injuries with respect to Axis I psychopathology (Mood Disorder, Major Depressive Disorder, Anxiety Disorder and Panic Disorder); however, upon controlling for the demographic variables and applying the adjustment for multiple comparisons, these differences were not longer significant. The patients with cervical injuries and those with lumbar injuries did not vary based on Axis II Personality Disorders (see Table A15) or on the MMPI profiles (see Table A16).

Upon controlling for the demographic variables, no significant differences were identified between the cervical injury and lumbar injury patients for the work-related variables (see Table A17). And likewise, the comparisons of the one-year socioeconomic outcomes for treatment completers did not show any differences in work-return, work-retention or healthcare-seeking behaviors between the patients with cervical injuries and those with lumbar injuries (see Table A18).

A sequential multivariate logistic regression analysis was conducted to determine the key risk factors associated with the cervical spine group compared to the lumbar group (see Tables A40 through A43). The first three blocks contained the demographic, injury-specific/occupation variables and the psychosocial variables. The addition of each of these blocks to the model was significant. However, Block 4, containing the DSM-IV Axis I and Axis II disorders, did not significantly contribute to the predictive model. The variables that were found to be significantly associated with cervical injuries in the final model (see Table A43) included being female, undergoing surgery prior to treatment, sustaining more compensable body injuries, and being diagnosed with Panic Disorder. Higher scores on the Million Visual Analog scale were significantly related to lumbar injuries. For the final model identifying the risk factors for developing chronic cervical spine disability compared to developing lumbar disability, the Nagelkerke R^2 was 0.222.

3.3 Lower Extremity Injuries

For the Lower Extremity portion of this study, a total of 2,042 patients were included. Patients with lower extremity injuries represented less than twenty percent of the cohort (N = 322) and were compared to the patients with lumbar injuries (N = 1,720). The specific diagnoses for lower extremity injuries are listed in Table B3. The single-variable comparisons are represented in Tables A19 through A27 and the multivariate analyses for the Lower Extremity comparisons are represented in Tables A44 – A47. As with the prior studies, a Holm-Bonferroni adjustment was made to correct for potential Type I errors resulting from the large number of comparisons being made. The demographic comparisons for the patients with lower extremity injuries and those with lumbar injuries are displayed in Table A19. While there are moderate differences in gender and ethnicity, those comparisons become non-significant with the Holm-Bonferroni adjustment. As shown in Table A20, the only injury-specific variable that distinguishes the patients with lower extremity injuries from those with lumbar injuries is pre-treatment surgery. In fact, patients who underwent surgery prior to admission to the functional restoration program were 4.1 times more likely to have incurred a lower extremity injury as compared to having a lumbar injury ($X2 = 115.059$, $p < .001$). However, there were no other differences found with respect to completion rate, length of disability, attorney retention, case settlement or the number of compensable body parts.

Upon controlling for the demographic variables, significant differences were identified between the lower extremity and lumbar groups on several psychosocial variables (see Table A21). Patients with lumbar injuries were more likely to report more depressive symptoms on the Beck Depression Inventory ($X2 = 12.703$, $p <.001$) and higher levels of perceived disability on the Million Visual Analog Scale ($X2 = 15.450$, $p < .001$). Moderate differences were also found for the Pain Intensity Analog and the Pain Disability Questionnaire, but were non-significant once the multiple comparison adjustment was implemented.

As seen in Tables A22-A23, there were no differences between the patients with lower extremity injuries and those with lumbar injuries with respect to Axis I and Axis II DSM-IV psychopathology. A moderate difference was identified in the Substance Use/Opioid Dependence and Any Cluster C Personality Disorder diagnoses, such that patients with lumbar injuries were more likely to develop a Substance Use Disorder/Opioid Dependence or be diagnosed with Avoidant, Dependent or Obsessive-Compulsive Personality Disorders; however, with the correction for multiple comparisons, this difference became non-significant.

Comparisons of the work-related variables indicated no significant differences in job type, job availability, job satisfaction or percent working at admission between the patients with lower extremity injuries and those with lumbar injuries. There was a moderate difference found between these groups with respect to job demand, in that those individuals with greater lifting demands were more likely to have lumbar injuries; however, this comparison became non-significant upon adjusting for multiple comparisons.

The one-year socioeconomic outcomes for the patients who completed the functional restoration rehabilitation program showed no differences in rates of work return, work retention, post-treatment healthcare-seeking behaviors or surgeries between the patients with lower extremity injuries and those with lumbar injuries (see Table A26). A sub-analysis was conducted to identify any differences in one-year socioeconomic outcomes within the lower extremity cohort based on the area of injury (hip, knee, ankle or foot). As seen in Table A27, no differences were found between patients with varied injuries of the lower extremity body regions.

A sequential multivariate logistic regression analysis was conducted to determine the key risk factors associated with the lower extremity group compared to the lumbar group (see Tables A44 through A47). The data were entered in four blocks which contained the demographic, the injury-specific/occupation variables, the psychosocial variables and the Axis I and Axis II DSM-IV diagnoses. The addition of Blocks 2 and 4 were the only significant contributions to this model. There were only two significant variables the discriminated between the lower extremity and lumbar injury groups. Pre-treatment surgery was significantly linked to lower extremity injuries and Opioid Dependence was significantly associated with lumbar injuries. For the final model identifying the risk factors for developing chronic lower extremity disability compared to developing lumbar disability, the Nagelkerke R^2 was 0.148.

3.4 Multiple Site Injuries

For the Multiple Site portion of this study, a total of 3,175 patients were included. Patients with multiple site injuries that included the lumbar region represented approximately one-third of the cohort (N = 993) and patients with multiple site injuries not including the lumbar region represented approximately twenty percent of the cohort (N = 597). Both groups were compared simultaneously to the patients with pure lumbar injuries (N = 1,585). The comparisons of the three groups were conducted using a multinomial logistic regression technique for which the demographic variables were controlled. The single-variable comparisons for the Multiple Site injuries are represented in Tables A28 through A35 and the multivariate analyses are represented in Tables A48 and A49. As with the prior studies, a Holm-Bonferroni adjustment was made to correct for potential Type I errors resulting from the large number of comparisons being made.

As seen in Table A28, there were significant differences found between the multiple site with lumbar, the multiple site without lumbar and the pure lumbar injury groups for the demographic variables. Male gender was most associated with the pure lumbar and multiple site with lumbar groups as compared to the multiple site without lumbar group ($X2 = 119.417$, $p < .001$). Age also varied such that patients with multiple injuries were more likely to be older than patients with pure lumbar injuries ($F = 18.930$, $p < .001$). Ethnicity also varied between the three comparison groups. The patients in the pure lumbar group were more likely to be Hispanic or White, while the multiple site groups had higher percentages of Blacks.

For the injury-specific variable comparisons, patients with multiple site injuries that did not include the lumbar region were 2.4 times more likely to have undergone pre-treatment surgery as compared to those with lumbar injuries ($X2 = 78.874$, $p < .001$). Table A29 shows marginally significant differences between the multiple site with lumbar group and the pure lumbar group with respect to completion rate, length of disability and attorney retention; however, with the multiple comparison adjustment, these findings are deemed insignificant.

As seen in Table A30, there were many significant differences in psychosocial factors identified between the three groups at the univariate level. After controlling for the demographic variables and for the multiple comparisons, the analysis revealed that the patients with lumbar injuries were significantly more likely to report higher levels of perceived disability as measured on the Million Visual Analog Scale ($X2 = 63.645$, $p < .001$) and on the Pain Disability Questionnaire ($X2 = 13.189$, $p < .001$) as compared to the patients with multiple site injuries not including the lumbar region.

The Axis I and Axis II DSM-IV diagnosis comparisons are presented on Tables A31 and A32. Patients with multiple site injuries, both including and excluding the lumbar region, were found to be more likely to have an Axis I clinical disorder as compared to the pure lumbar group. In particular, Mood Disorder, Major Depressive Disorder and Panic Disorder were identified more often with the multiple site injury group that included lumbar injuries. The percentage of individuals with Mood Disorder, Major Depressive Disorder, Substance Use Disorder, Opioid Dependence, Anxiety Disorder and Panic Disorder were significantly higher in the non-lumbar multiple site group as compared to the pure lumbar group; however, once the adjustment was made for the multiple comparisons, the differences in these Axis I clinical disorders were no longer found to be significant. As seen in Table A33, patients with multiple injuries including the lumbar region were found to be 1.4 times more likely to be identified with the Disability Profile of the MMPI ($X2 = 9.714$, $p = .002$).

The comparisons of the work-related variables are presented in Table A34. No significant differences were found between the patients with multiple injury sites and those with pure lumbar injuries with respect to job code, job availability, job satisfaction and work status at admission to treatment. The patients whose job demands required medium to very heavy lifting were 1.4 times more likely to have pure lumbar injuries in comparison to the non-lumbar multiple site injury group ($X2 = 9.941$, $p = .002$).

The one-year socioeconomic outcomes for the patients who completed the functional restoration program are presented in Table A35. There were no significant differences found between the pure lumbar group and the multiple site injury groups with respect to work return, work retention, post-treatment surgery or healthcare-seeking behaviors.

A simultaneous multinomial logistic regression model was used to identify any key risk factors associated with the multiple site injury groups (with and without lumbar injuries) as compared to the pure lumbar group (see Table A48 – A49). The risk factors associated with the multiple injury site including lumbar injuries were female gender and increased age. In comparing the main risk factors associated with the non-lumbar multiple site group, female gender and pre-treatment surgeries were significantly associated with the non-lumbar multiple site group. Whereas,higher scores on the Million Visual Analog Scale and the diagnosis of Opioid Dependence were significantly related to the pure lumbar group. The final model was significant (X2 = 156.755, p <.001) and the Nagelkerke R^2 was 0.231.

3.5 Comparison of All Injury Types

A final analysis was conducted to discern the factors with the highest association to the various injury groups. As seen in Tables A50 through A52, the patients with pure lumbar injuries were compared to those with pure upper extremity injuries, pure cervical injuries and pure lower extremity injuries using a simultaneous multinomial logistic regression model. The overall model was significant (X2 = 202.488, p < .001) with a Nagelkerke R^2 = .334.

The factors significantly linked to pure upper extremity injuries were identified to be: female gender, having undergone pre-treatment surgery, lower length of disability, lower levels of perceived disability and pain intensity ratings, and higher perceived quality of life indicators of physical health (see Table A50). The analyses for the pure cervical spine injury group are presented in Table A51. The overall model found no significant risk factors to be associated with the pure cervical spine group with reference to the pure lumbar group. For the patients with pure lower extremity injuries, the key factors (see Table A52) were identified as: having undergone surgery prior to treatment and having a lower length of disability as compared to the pure lumbar group.

For the one-year socioeconomic outcomes, a multinomial logistic regression model was used to compare patients with pure upper extremity injuries (see Table A54), pure cervical injuries (see Table A55) and pure lower extremity injuries (see Table A56) in reference to those patients with pure lumbar injuries. This overall model was not significant and it showed that patients with non-lumbar injuries did not differ on rates of work return or work retention following functional restoration treatment. Furthermore, the only factor that was found to differentiate between the groups was health-care seeking behaviors, such that patients with chronic lumbar injuries were more likely to utilize additional healthcare following treatment as compared to the pure upper extremity and pure lower extremity groups.

CHAPTER 4

DISCUSSION

The present study represents a comprehensive examination of patients with chronic disabling occupational musculoskeletal disorders who were admitted to a tertiary functional restoration program. This goal of this study was to identify the prevalence, risk factors and treatment outcomes of patients with chronic upper extremity, cervical, lower extremity and multiple site injuries seeking rehabilitative treatment at a regional functional restoration facility. Because the majority of the research on chronic occupational musculoskeletal disorders has focused on patients with lumbar injuries, the results of this study help to provide a more comprehensive understanding of chronic occupational disability through the investigation of non-lumbar injuries.

A key portion of this study is in the evaluation of treatment outcomes. Through the use of evidence-based research, objective criteria can be established to identify successful outcomes. The Official Disability Guidelines (ODG) provides up-to-date evidence-based research on benchmarking, duration and treatment of occupational injuries (Official Disability Guidelines, 2008). Some of the objectives of the ODG include: reduction of delayed recovery time; reduction of medical costs; and helping injured workers safely return to work in a reasonable amount of time. The evaluation of work return and work retention following treatment for chronic occupational musculoskeletal disorders is seen as an objective evidence-based research outcome (T. Mayer, 2007). Therefore, this study aimed to identify if the treatment outcomes for non-lumbar areas of injury (upper extremity, cervical, lower extremity and multiple site) differ from those of patients with chronic lumbar injuries.

4.1 Upper Extremity Injuries

The majority of research available on upper extremity injuries focuses on the factors related to being injured and on the prevention and intervention strategies developed to decrease the occurrence of injury. However, while much is known about the development of chronic lumbar disability, very little is known about the risk factors associated with the development of chronic upper extremity disorders. Therefore, the basis of this study compared patients with chronic upper extremity disorders to those with chronic lumbar disorders to identify the key risk factors that distinguish the two groups. Furthermore, the patients in this portion of the study were evaluated on the basis of one-year socioeconomic outcomes following rehabilitative treatment.

The upper extremity portion of this study examined the prevalence, risk factors and treatment outcomes for patients with chronic upper extremity disorders. Patients with chronic upper extremity disorders represented approximately one-fourth of the patients in the study who sought rehabilitative treatment at a functional restoration facility. The focus of this study compared patients with chronic non-lumbar injuries to those with standard lumbar / low-back injuries. As expected, there were differences found with respect to the demographic, injury-specific, psychosocial and work related variables under consideration as possible risk factors for developing chronic upper extremity disorders. Because the difference in gender between the lumbar and upper extremity groups was quite large, the subsequent analyses controlled for the variance attributed by gender. Age and ethnicity, however, did not vary between the two groups.

Pre-treatment surgery was another key factor that distinguished the upper extremity group from the lumbar group. In fact, 58.2% of the patients with upper extremity injuries underwent surgery prior to treatment. With such a high percentage of patients needing rehabilitative treatment following surgery, it would lead one to question whether the surgery itself was necessary or sufficient for patients with upper extremity injuries.

At the univariate level, patients with upper extremity injuries were found to be more likely to have a "white collar" job, which usually requires little physical demands. However, once gender was controlled for, differences in job type were no longer significant. Likewise, at the multivariate level, job type and job demand were not found to be significantly associated with upper extremity injuries; yet, gender still remained significant. This implies that regardless the type of job and the physical demand of the job, females are at greater risk for developing chronic upper extremity disorders as compared to those developing chronic lumbar disorders.

For the psychosocial comparisons, patients with upper extremity injuries showed less psychosocial distress as compared to those with lumbar injuries, even after controlling for gender. Patients with upper extremity injuries had fewer depressive symptoms and reported lower ratings of pain intensity and perceived disability as compared to the patients with lumbar injuries. The perception of disability and pain, in conjunction with depressive symptoms, may be more attributable to the perceived severity of the injury rather than the actual physical disability. Substance Use, including Opioid Dependence, was found to be much higher for patients with lumbar injuries compared to those with upper extremity injuries at the univariate level. Because patients with lumbar injuries had significantly greater durations of disability prior to treatment, it is plausible that not only could there be a correlation between the length of disability and dependency on pain medication, but also the perception of the severity of the injury could also mediate the reliance on pain medication.

While there were several identified risk factors that contribute to the development of chronic upper extremity disorders, the one-year socioeconomic outcomes did not differ between those with chronic upper extremity disorders and those with chronic lumbar disorders. Regardless the types of injury, patients were equally likely to return-to-work and to retain work one year following treatment at a functional restoration rehabilitation facility. While patients with lumbar injuries were slightly more likely to exhibit post-treatment healthcare-seeking behaviors, very few patients with upper extremity or lumbar injuries required surgery to the same injured area. These outcomes indicate that functional restoration treatment is as effective for patients with chronic upper extremity disabilities as it is for patients with chronic lumbar disabilities.

Ample research is available on the prevention and intervention techniques being developed and implemented to reduce the frequency and severity of occupational upper extremity injuries. However, little has been noted on the development of chronic upper extremity injuries. This study is the first step to identifying the key factors associated with the development of chronic upper extremity disorders in relation to the factors associated with chronic lumbar disorders. Further research would be necessary to identify the key factors that distinguish individuals who are successfully treated for upper extremity injuries at the acute stage from those who develop a chronic condition.

4.2 Cervical Spine Injuries

While research has identified the risk factors for incurring work related cervical injuries, very little information is available on the development of chronic occupational cervical spine disorders. Because there is much known about chronic occupational lumbar disorders, the present portion of this study aims to identify the key factors associated with the development of chronic occupational cervical disorders in comparison to the factors associated with chronic lumbar disability.

The rate of developing chronic cervical injuries is fairly low; only 4.2% of the patients in this study were treated for a cervical spine disorders. There were few differences noted in the risk factors that distinguish patients with chronic cervical injuries from patients with chronic lumbar injuries. Similar to the upper extremity disorders, the patients in the cervical spine group were significantly more likely to be female and to have undergone surgery prior to treatment. Patients with cervical disorders also reported more compensable bodily injuries as compared to those with lumbar disability.

In comparing the psychosocial factors, patients with lumbar injuries reported higher levels of perceived disability on the Million Visual Analog Scale; yet, there were no distinguishable differences in ratings of pain intensity, quality of life indicators, or depressive symptomology. Psychopathology is commonly found in chronic pain populations (J. Dersh, P. Polatin, & R. J. Gatchel, 2002). One difference in this study, however, that stood out with the univariate comparisons of the cervical injuries were the rates of Axis I psychopathology. Patients with cervical injuries were more likely than patients with lumbar disorders to be diagnosed with Mood Disorder, Major Depressive Disorder, Anxiety Disorder or Panic Disorder. Interestingly, there were no differences identified with respect to Substance Use or Opioid Dependence. Since patients with lumbar disorders are typically identified as having more issues with substance use, these results show that patients with chronic cervical disorders also develop substance use problems at the same rate as the lumbar patients.

Treatment for patients with chronic cervical disabilities was shown to be very effective through the multidisciplinary functional restoration rehabilitation program. For patients with chronic cervical disorders, there were no differences found in the one-year socioeconomic outcomes following completion of treatment at a functional restoration facility as compared to the outcomes of patients with lumbar disorders. Rates of work return and work retention mirrored those of the lumbar disability group, such that greater than 85% of patients completing the function restoration program returned to work within one year following treatment and of those who returned to work, approximately 80% retained work one-year post-treatment.

While this study compared patients with chronic cervical disorders to those with chronic lumbar disorders, more information is needed to truly understand the development of chronic occupational cervical disorders. The next step in this line of research would be to create a longitudinal study for which patients with acute cervical disorders would be evaluated and followed to see which factors are associated with chronic cervical disorders in comparison to those who are successfully treated at the acute stage.

4.3 Lower Extremity Injuries

Because work related lower extremity injuries are not as prevalent as injuries to other body parts, there is very little known about the development of chronic occupational lower extremity disorders. This portion of the study aimed to identify the key risk factors associated with the development of chronic lower extremity disorders in relation to those factors associated with lumbar disorders.

For the Lower Extremity portion of this study, the patients with injuries involving the hip, knee, ankle or foot were compared to the patients with lumbar injuries. The lower extremity group accounted for approximately 16% (N = 322) of this cohort. While determining the key risk factors associated with lower extremity injuries in comparison to lumbar injuries, very few distinctions were identified. Upon controlling for multiple comparisons, no differences were found for gender, age or ethnicity. Of the injury-specific variables considered, the only discerning factor found to distinguish the lower extremity group from the lumbar group was the higher percentage of pre-treatment surgeries. However, the lower extremity group and the lumbar group did not vary with respect to completion rate, length of disability, attorney retention, case settlement or the number of compensable body parts.

There were a few differences identified within the psychosocial factors to be significantly different between the lower extremity and lumbar groups. Patients with lower extremity injuries reported fewer symptoms of depression on the Beck Depression Inventory. Likewise, the patients with lower extremity injuries reported lower levels of perceived disability on the Million Visual Analog Scale as compared to the patients in the lumbar group. Prior to the adjustment for multiple comparisons, the patients in the lower extremity group reported lower levels of pain on the Pain Intensity Analog. No differences were found between the lower extremity group and the lumbar group on quality of life measures. The comparison of Axis I and Axis II DSM-IV diagnoses also were comparable between the two groups. Prior to applying the adjustment for multiple comparisons, the rates of Substance Use, Opioid Dependence and Any Cluster C Personality Disorder were higher for the lumbar group as compared to the lower extremity group.

In comparing the work related variables for the lower extremity and the lumbar groups, there were no differences identified for job type, job availability, job satisfaction or working at admission to treatment. At the univariate level (prior to adjustment for multiple comparisons), patients with a medium to very heaving lifting demand were more likely to develop chronic lumbar disorders as compared to lower extremity disorders.

The hierarchical logistic regression model identified two key risk factors that distinguished the lower extremity group from the lumbar group. Similar to the upper extremity and cervical injury groups, patients with lower extremity injuries were more likely to undergo surgery prior to treatment as compared to the patients in the lumbar group. Also, patients with lower extremity injuries were less likely to develop Opioid Dependence as compared to patients in the lumbar group. Aside from these two factors, no other variables were found to differentiate the patients with chronic lower extremity injuries from those with chronic lumbar injuries.

Patients who have completed a functional restoration rehabilitation for chronic occupational disabilities have been shown repeatedly to exhibit positive post-treatment socioeconomic outcomes (R J Gatchel & Okifuji, 2006; T. G. Mayer et al., 1987). As seen with the upper extremity and cervical group comparisons, the patients in the lower extremity group did not differ from those with lumbar injures with respect to the one-year socioeconomic outcomes, such that there were no differences identified in work return, work retention or post-treatment healthcare seeking behaviors.

4.4 Multiple Site Injuries

Occupational injuries can affect multiple regions of the body, especially when the injury is related to an accident, rather than from overexertion or repetitive motions. This portion of the study focused on identifying the prevalence, risk factors and treatment outcomes of patients who develop chronic disability due to multiple injuries in comparison to those with pure lumbar injuries (N = 1585, 49.9%). The patients with multiple injuries were divided into two groups: 1) multiple injury sites including the lumbar region (N = 993, 31.3%); and 2) multiple injury sites excluding the lumbar region (N = 597, 18.8%).

For the demographic comparisons, patients whose injuries involved the lumbar region (either pure or multiple site) were significantly more likely to be male as compared to those with non-lumbar multiple injury sites. In comparing the injury-specific variables, patients with non-lumbar injuries were significantly more likely to have undergone surgery prior to admission to rehabilitative treatment. This finding parallels that of the upper extremity, cervical and lower extremity groups.

At the univariate level, there were many differences found in psychosocial assessments between the three comparison groups. The multiple site group that included lumbar injuries reported higher levels of depression symptoms, higher ratings of pain intensity, and higher ratings of perceived disability on both the Million Visual Analog Scale and on the Pain Disability Questionnaire. However, upon controlling for demographic variables and for the multiple comparisons, the only psychosocial factor that differentiated the three groups was perceived disability, in that the pure lumbar group reported significantly higher ratings of disability as compared to the non-lumbar multiple site group. The Disability Profile on the MMPI has been identified to be an indicator of disability behaviors in patients with chronic occupational disability (Anagnostis, Mayer, Gatchel, & Proctor, 2003). In this study, patients with multiple injuries including the lumbar region were significantly more likely to fall within the Disability Profile on the MMPI as compared to the patients in the non-lumbar multiple site group or the pure lumbar group.

Axis I psychopathology is highly prevalent in chronic pain populations (J. Dersh, P. Polatin, & R. J. Gatchel, 2002). In the current study, the rates of Axis I DSM-IV diagnoses differed significantly between the multiple site groups (both with and without lumbar) as compared to the pure lumbar group. Patients with multiple site injuries were more likely to be diagnosed with Mood Disorder, Major Depressive Disorder or Anxiety Disorder. Patients with lumbar injuries (either pure or multiple site) were more likely to develop Substance Use Disorders at the univariate level.

When comparing the work related factors for the multiple site and lumbar injury groups, there were no significant differences found with respect to job satisfaction, job availability or work status at admission to treatment. As compared to the non-lumbar multiple injury site group, patients with pure lumbar injuries were more likely to have medium to very heavy physical lifting demands, even when controlling for demographics.

The overall multinomial logistic regression model comparing patients with multiple site injuries to those with pure lumbar injuries identified few factors that distinguished the groups. For the multiple site group that included the lumbar region, older patients and female gender were the key factors that discriminated the multiple site with lumbar group from the pure lumbar group. In comparing the non-lumbar multiple site group with the pure lumbar group, the key factors associated with the non-lumbar multiple site injury group were female gender and pre-treatment surgery. Patients with lumbar injuries were more likely to report higher levels of perceived disability and to develop Opioid Dependence as compared to the non-lumbar multiple site group.

4.5 Comparison of All Injury Types

The previous sections outlined the differences between the specified injured regions (upper extremity, cervical and lower extremity) in comparison to the lumbar cohort separately. The final comparison used a multinomial logistic regression model to identify the key risk factors for these injury groups simultaneously. For this model, each of the injury groups presented included patients with pure regional injuries rather than multiple site injuries.

The key factors in this model related to pure upper extremity injuries included being female, having undergone surgery prior to treatment, having a lower length of disability, reporting higher indicators of physical health, and reporting lower ratings of perceived disability and pain intensity. Within this model, there were no factors that distinguished pure cervical injuries from pure lumbar injuries. The only factor that was significantly associated with the pure lower extremity group was having undergone surgery prior to treatment.

On the basis of post-treatment one-year socioeconomic outcomes, patients with pure upper extremity or pure lower extremity injuries were less likely to exhibit post-treatment healthcare-seeking behaviors as compared to those in the pure lumbar group. Otherwise, there were no differences in the rates of work return, work retention and post-treatment surgery between the pure upper extremity, pure cervical and pure lower extremity groups as compared to the pure lumbar group. While the interdisciplinary approach to treatment of chronic occupational lumbar disorders has been shown to be highly successful, the finding of this study show that functional restoration is as successful for all musculoskeletal injury regions as it is for chronic lumbar disorders.

4.6 General Conclusions

Because lumbar injuries are the most common type of non-fatal occupational musculoskeletal injuries, the majority of the research on chronic pain conditions has been aimed at identifying risk factors and treatment options for patients who develop chronic low back disability (Badii, Keen, Yu, & Yassi, 2006; Gatty, Turner, Buitendorp, & Batman, 2003; Martin, Irvine, Fluharty, & Gatty, 2003; Vieira & Kumar, 2006). The primary risk factors associated with chronic lumbar disability have been identified as: increased age (R.J. Gatchel, Bernstein, Stowell, & Pransky, 2008; T. G. Mayer, Gatchel, & Evans, 2001), female gender (R.J. Gatchel, Bernstein, Stowell, & Pransky, 2008), white or black race (R.J. Gatchel, Bernstein, Stowell, & Pransky, 2008), increased pain intensity (R.J. Gatchel, Bernstein, Stowell, & Pransky, 2008;

Gheldof, Vinck, Vlaeyen, Hidding, & Crombez, 2007), increased depressive symptomology and increased perceived depression (R.J. Gatchel, Bernstein, Stowell, & Pransky, 2008), and poor social support and job satisfaction (Lefevre-Colau et al., 2009). There is very little research available on chronic non-lumbar occupational musculoskeletal disorders. The majority of the research available on upper extremity, cervical and lower extremity injuries has focused on prevention and intervention at the occupational level. The goal of this study was to evaluate the prevalence, risk factors and treatment outcomes for patients with chronic non-lumbar injuries in comparison to those with lumbar injuries.

In general, the demographic variables differed between the non-lumbar group and the lumbar group on the basis of gender. While females have been identified to be more at risk for developing chronic lumbar disorders, females were more associated with developing chronic upper extremity, cervical and lower extremity musculoskeletal disorders.

The main key difference between the lumbar and non-lumbar groups was the rate of pre-treatment surgeries, such that patients with upper extremity injuries, cervical injuries and lower extremity injuries were significantly more likely to undergo surgery prior to rehabilitation. One of the criteria for admission to the functional restoration program is that surgery is either not necessary or that surgery did not provide relief from pain and return of function to the injured area. Interestingly, the rates of post-treatment surgeries to the original injured area did not differ between any of the comparison groups and was relatively low. Based on this finding, surgery for upper extremity, cervical and lower extremity injuries may not be necessary if treated with rehabilitation from a multi-disciplinary functional restoration facility. From a cost-savings perspective, future studies should focus on the necessity of surgery as compared to rehabilitation for these types of injuries.

Functional restoration has been shown repeatedly to produce successful socioeconomic outcomes for patients with chronic occupational lumbar injuries who complete the program. While the severity of injuries and the perception of disability may differ depending on the type of injury sustained, there were no significant differences found in this study between the non-lumbar groups and the lumbar group with respect to work return and work retention post-treatment. These findings show that regardless the area of injury, using a interdisciplinary approach to management and treatment of chronic occupational musculoskeletal injuries is highly successful in restoration of function and return to normal activities, regardless the area of injury.

APPENDIX A

STATISTICAL ANALYSES TABLES

Table A1. Upper Extremity Demographic Characteristics (N = 2484).

Demographic Variables	**Upper Extremity** n = 811 32.6%	**Lumbar Spine** n = 1673 67.4%	**Univariate Comparison**
Gender (% Male) Valid N = 2483	36.3%	62.0%	*p* < .001 X^2 = 144.808 OR= 2.9 [2.4, 3.4]
Age Mean yr/(SD) Valid N = 2484	46.4 (9.9)	45.8 (9.8)	NS
Ethnicity (%) African American Caucasian Hispanic Asian Other Valid N = 2484	 24.7% 42.9% 17.5% 1.6% 13.3%	 19.7% 47.4% 18.8% 1.4% 12.7%	*p* = .047** X^2 = 9.656

** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A2. Upper Extremity Injury-Specific Variables (N = 2484).

Injury-Specific Variables	**Upper Extremity** n = 811 32.6%	**Lumbar Spine** n = 1673 67.4%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Completion Rate (%) Valid N = 2484	77.3%	73.4%	$p = .036$** $X^2 = 4.418$ OR= 1.2 [1.0, 1.5]	$p = .024$** Wald $X^2 = 5.072$ OR= 1.3 [1.0, 1.5]
Temporary-Total Disability Months/(SD) Valid N = 2119	14.0 (15.0)	16.2 (20.1)	$p = .005$** $t = 2.805$ Cohen's $d = 0.12$	$p = .006$** Wald $X^2 = 7.660$ OR= 0.992 [.987, .998]
Length of Disability Months/(SD) Valid N = 2482	18.4 (24.8)	20.5 (27.2)	$p = .046$** $t = 1.998$ Cohen's $d = 0.08$	$p = .009$** Wald $X^2 = 6.742$ OR= 0.995 [.992, .999]
Pretreatment Surgeries (%) Valid N = 2417	58.2%	32.3%	$p < .001$ $X^2 = 147.05$ OR= 2.9 [2.4, 3.5]	$p < .001$ Wald $X^2 = 158.32$ OR= 3.3 [2.8, 4.0]
Attorney Retained (%) Valid N = 2354	17.8%	20.7%	NS	NS
Case Settlement – Pre-treatment (%) Valid N = 2419	28.3%	29.9%	NS	NS
Compensable Body Parts Mean (SD) Valid N = 2484	1.8 (0.9)	1.4 (0.7)	$p < .001$ $t = 10.357$ Cohen's $d = 0.50$	$p < .001$ Wald $X^2 = 93.858$ OR= 1.72 [1.54, 1.92]

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A3. Upper Extremity Pre-Treatment Psychosocial Variables (N= 2400)

Psychosocial Variables (Pre-Treatment)	**Upper Extremity** n = 789 32.9%	**Lumbar Spine** n = 1611 67.1%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
BDI X/(SD) Valid N = 2394	17.3 (11.4)	18.8 (11.1)	$p = .002$ $t = 3.069$ Cohen's $d = 0.12$	$p < .001$ Wald $X^2 = 16.216$ OR= 0.98 [0.97, 0.99]
Pain Intensity X/(SD) Valid N = 2398	6.6 (1.9)	6.8 (1.8)	$p = .006$** $t = 2.742$ Cohen's $d = 0.11$	$p < .001$ Wald $X^2 = 15.025$ OR= 0.91 [0.87, 0.95]
MVAS X/(SD) Valid N = 2376	82.7 (25.4)	99.3 (22.7)	$p < .001$ $t = 15.272$ Cohen's $d = 0.68$	$p < .001$ Wald $X^2 = 226.46$ OR= 0.969 [0.965, 0.973]
PDQ X/(SD) Valid N= 903	92.7 (26.1)	103.4 (23.9)	$p < .001$ $t = 5.984$ Cohen's $d = 0.43$	$p < .001$ Wald $X^2 = 38.508$ OR= 0.982 [0.976, 0.987]
Functional	55.2 (16.1)	62.0 (14.9)	$p < .001$ $t = 4.488$ Cohen's $d = 0.44$	$p < .001$ Wald $X^2 = 39.717$ OR= 0.97 [0.961, 0.979]
Psychosocial	37.5 (13.0)	41.5 (12.1)	$p < .001$ $t = 6.171$ Cohen's $d = 0.32$	$p < .001$ Wald $X^2 = 23.339$ OR= 0.971[0.959, 0.983]
SF-36 Summary X/(SD) Valid N = 1448				
Mental Health	38.5 (9.9)	39.0 (9.9)	NS	NS
Physical Health	32.1 (12.7)	29.1 (5.7)	$p < .001$ $t = 4.887$ Cohen's $d = 0.30$	$p < .001$ Wald $X^2 = 53.677$ OR= 1.08 [1.06, 1.10]

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.

** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A4. Upper Extremity Post-Injury Axis I DSM-IV Diagnoses (N = 2278)

Axis I Variables	**Upper Extremity** n = 745 32.7%	**Lumbar Spine** n = 1533 67.3%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Mood Disorder (%) Valid N = 2278	57.2%	52.8%	NS	NS
Major Depressive Disorder (%) Valid N = 2278	56.1%	52.4%	NS	NS
Substance Use Disorder (%) Valid N = 2278	13.4%	23.3%	$p < .001$ $X^2 = 30.423$ OR= 2.0 [1.5, 2.5]	$p < .001$ Wald $X^2 = 18.215$ OR= 1.73 [1.34, 2.22]
Alcohol Dependency	1.2%	1.6%	NS	NS
Opioid Dependency	11.3%	20.6%	$p < .001$ $X^2 = 30.200$ OR= 2.0 [1.6, 2.6]	$p < .001$ Wald $X^2 = 20.963$ OR= 1.87 [1.43, 2.44]
Anxiety Disorder (%) Valid N = 2278	18.0%	16.2%	NS	NS
Panic Disorder (%) Valid N = 2278	6.2%	4.4%	NS	NS

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A5. Upper Extremity Post-Injury Axis II DSM-IV Diagnoses (N = 2143)

Axis II Variables	**Upper Extremity** n = 699 32.6%	**Lumbar Spine** n = 1444 67.4%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Any Cluster A Diagnosis at Admission Valid N = 2143	21.6%	19.8%	NS	NS
Any Cluster B Diagnosis at Admission Valid N = 2143	31.8%	35.0%	NS	NS
Any Cluster C Diagnosis at Admission Valid N = 2143	25.5%	23.9%	NS	NS

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.

** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A6. Upper Extremity MMPI Clusters (N= 1452)

MMPI Clusters	**Upper Extremity** n = 467 32.2%	**Lumbar Spine** n = 985 67.8%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
MMPI Normal Profile 0 Scale Elevations (%)	8.1%	7.6%	NS	NS
MMPI Disability Profile 4 or more scale elev. (%)	45.0%	49.4%	NS	*p* = .009** Wald X^2 = 6.781 OR= 1.36 [1.08, 1.72]
MMPI Conversion V Scale 1 & 3 elev. (%)	9.9%	11.7%	NS	NS
MMPI Neurotic Triad Scale 1,2,& 3 elev. (%)	9.0%	7.2%	NS	NS

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A7. Upper Extremity Work Related Variables (N= 2433).

Work Related Variables	**Upper Extremity** N = 793 32.6%	**Lumbar Spine** N = 1640 67.4%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Work Status at Admission (% Yes) Valid N = 2484	13.8%	12.8%	NS	NS
Original Job Available (% Yes) Valid N = 2396	50.1%	48.0%	NS	NS
Job Satisfaction (PRE) 1- Very Satisfied 2- Satisfied 3- Neither 4- Dissatisfied 5- Very Dissatisfied Valid N = 1872	 57.0% 25.2% 10.4% 4.0% 3.4%	 57.6% 24.8% 12.1% 2.9% 2.6%	NS	NS
Job Code (% Blue) Valid N = 2409	66.1%	74.7%	$p < .001$ $X^2 = 19.522$ OR: 1.5 [1.3, 1.8]	NS
Job Demand 1- Sedentary /Light 2- Light/ Medium 3- Medium/Heavy 4- Heavy/Very Valid N = 2433	 24.1% 30.6% 29.8% 15.5%	 9.6 % 25.1% 38.2% 27.0%	 $p < .001$ $X^2 = 12.088$	 $p < .001$ Wald $X^2 = 14.843$ OR for levels 3/4: 1.5 [1.2, 1.8]

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.

** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A8. Upper Extremity One-Year Outcomes - (Completers Only) (N= 1644)

One Year Outcomes	**Upper Extremity** n = 556 33.8%	**Lumbar Spine** n = 1088 66.2%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Return to Work 1 Year (%) Valid N = 1644	86.0%	88.3%	NS	NS
Work Retention 1 Year Valid N = 1624	79.8%	81.0%	NS	NS
Treatment Seeking 1 Year Valid N = 1685	16.8%	21.2%	*p* = .035** X^2 = 4.457 OR: 1.3 [1.0, 1.7]	*p* = .041** Wald X^2 = 4.187 OR= 1.3 [1.0, 1.7]
Visits to New Provider 1 Year Mean(SD) Valid N = 1685	1.8 (5.8)	2.2 (6.1)	NS	NS
New Surgery To Original Site 1 Year Valid N = 1671	3.0%	2.3%	NS	NS
Case Settlement 1 Year Valid N = 1736	97.7%	95.2%	*p* = .004** X^2 = 8.221 OR: 2.2 [1.3, 3.7]	*p* = .003** Wald X^2 = 8.562 OR= 2.3[1.3, 4.2]

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A9. Upper Extremity Neuropathic vs Non-Neuropathic Injuries: One-Year Outcomes - (Completers Only)

One Year Outcomes	**UEN Neuropathic** N = 191 11.6% L-UE 34.4% UE	**NNUE Non-Neuro** N = 365 22.2% L-UE 65.6% UE	**UEN / NNUE Comparison**	**Lumbar Spine** N = 1088 66.2%	**L-UE Comparison**
Completion Rate (%)	74.9%	78.7%	NS	73.4%	NS
Return to Work 1 Year (%)	83.4%	88.4%	NS	88.3%	NS
Work Retention 1 Year	77.1%	81.7%	NS	81.0%	NS
Treatment Seeking 1 Year	17.5%	17.4%	NS	21.2%	NS
Visits to New Provider 1 Year Mean(SD)	1.9 (5.8)	1.7 (5.5)	NS	2.2 (6.1)	NS
New Surgery To Original Site 1 Year	3.5%	2.5%	NS	2.3%	NS
Case Settlement 1 Year	95.9%	96.0%	NS	95.2%	p = .015** X^2 = 8.367

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A10. Upper Extremity Specific Body Region and Lumbar One-Year Outcomes - (Completers Only)

One Year Outcomes	**Multiple UE** n = 142 8.6% L-UE 25.5% UE	**Shoulder** n = 213 13.0% L-UE 38.3% UE	**Elbow** n = 35 2.1% L-UE 6.3% UE	**Wrist** n= 136 8.3% L-UE 24.4% UE	**Hand** n = 30 1.8% L-UE 5.4% UE	**UE Comparison**	**Lumbar Spine** n = 1088 66.2% L-UE	**L-UE Comparison**
Completion Rate (%)	79.7%	78.9%	75.0%	76.0%	66.0%	NS	73.4%	NS
Return to Work 1 Year (%)	84.5%	86.9%	85.7%	83.8%	96.7%	NS	88.3%	NS
Work Retention 1 Year (%)	80.1%	79.3%	71.4%	79.4%	93.1%	NS	81.0%	NS
Treatment Seeking 1 Year (%)	19.6%	19.5%	8.1%	11.4%	20.0%	NS	21.2%	NS
Visits to New Provider 1 Year Mean(SD)	2.0 (6.1)	2.2 (6.6)	0.5 (1.9)	1.2 (4.3)	2.8 (7.4)	NS	2.2 (6.1)	NS
New Surgery To Original Site 1 Year (%)	4.1%	2.8%	0.0%	3.6%	0.0%	NS	2.3%	NS
Case Settlement 1 Year (%)	95.3%	95.5%	97.2%	94.6%	93.5%	NS	97.7%	NS

Table A11. Cervical Demographic Characteristics (N = 2495).

Demographic Variables	**Cervical Spine** n = 523 21.0%	**Lumbar Spine** n = 1972 79.0%	**Univariate Comparison**
Gender (% Male) Valid N = 2495	48.2%	64.5%	$p < .001$ $X^2 = 46.007$ OR= 1.9 [1.6, 2.4]
Age Mean yr/(SD) Valid N = 2495	46.2 (9.6)	44.7 (10.0)	$p = .002$ $t = 3.137$ Cohen's $d = 0.15$
Ethnicity (%) African American Caucasian Hispanic Asian Other Valid N = 2495	 19.7% 56.2% 14.0% 1.1% 9.0%	 16.4% 52.7% 19.6% 1.1% 10.2%	 $p = .023$** $X^2 = 11.361$

** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A12. Cervical Injury-Specific Variables (N = 2495).

Injury-Specific Variables	**Cervical Spine** n = 523 21.0%	**Lumbar Spine** n = 1972 79.0%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Completion Rate (%) Valid N = 2495	80.7%	79.8%	NS	NS
Temporary-Total Disability Months/(SD) Valid N = 1638	17.4 (20.3)	15.9 (19.9)	NS	NS
Length of Disability Months/(SD) Valid N = 2490	20.2 (23.3)	19.0 (27.4)	NS	NS
Pretreatment Surgeries (%) Valid N = 2441	41.4%	33.6%	p = .001 X^2 = 10.826 OR= 1.4 [1.1, 1.7]	p < .001 Wald X^2 = 12.262 OR= 1.4 [1.2, 1.8]
Attorney Retained (%) Valid N = 2378	21.1%	19.7%	NS	NS
Case Settlement – Pre-treatment (%) Valid N = 2418	27.3%	27.5%	NS	NS
Compensable Body Parts Mean (SD) Valid N = 2495	1.9 (0.9)	1.3 (0.6)	p < .001 t = 14.853 Cohen's d = 0.78	p < .001 Wald X^2 = 207.93 OR= 2.6 [2.3, 2.9]

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A13. Cervical Pre-Treatment Psychosocial Variables (N= 2419)

Psychosocial Variables (Pre-Treatment)	**Cervical Spine** n = 509 21.0%	**Lumbar Spine** n = 1910 79.0%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
BDI X/(SD) Valid N = 2409	18.3 (10.6)	17.8 (10.6)	NS	NS
Pain Intensity X/(SD) Valid N = 2419	6.8 (1.9)	6.8 (2.7)	NS	NS
MVAS X/(SD) Valid N = 2399	91.3 (24.8)	96.9 (23.6)	*p* < .001 *t* = -4.680 Cohen's *d* = 0.23	*p* < .001 Wald X^2 = 33.772 OR= 1.01 [1.01, 1.02]
PDQ X/(SD) Valid N= 680	101.2 (22.7)	104.3 (22.8)	NS	NS
Functional	60.6 (13.5)	62.5 (14.5)	NS	NS
Psychosocial	40.6 (11.2)	41.8 (12.0)	NS	NS
SF-36 Summary X/(SD) Valid N = 1123				
Mental Health	39.0 (9.6)	39.2 (9.8)	NS	NS
Physical Health	31.2 (16.2)	29.2 (5.8)	NS	*p* = .004** Wald X^2 = 8.421 OR= 1.04 [1.01, 1.06]

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A14. Cervical Post-Injury Axis I DSM-IV Diagnoses (N = 2222)

Axis I Variables	**Cervical Spine** n = 457 20.6%	**Lumbar Spine** n = 1765 79.4%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Mood Disorder (%) Valid N = 2222	60.2%	50.9%	$p < .001$ $X^2 = 12.589$ OR: 1.5 [1.2, 1.8]	$p = .003$** Wald $X^2 = 8.579$ OR: 1.4 [1.1, 1.7]
Major Depressive Disorder (%) Valid N = 2222	59.1%	50.4%	$p = .001$ $X^2 = 10.901$ OR: 1.4 [1.1, 1.7]	$p = .008$** Wald $X^2 = 7.093$ OR: 1.3 [1.1, 1.7]
Substance Use Disorder (%) Valid N = 2222	18.2%	22.0%	NS	NS
Alcohol Dependency	1.5%	1.5%	NS	NS
Opioid Dependency	17.3%	19.7%	NS	NS
Anxiety Disorder (%) Valid N = 2222	17.5%	12.6%	$p = .006$** $X^2 = 7.505$ OR: 1.5 [1.1, 2.0]	$p = .032$** Wald $X^2 = 4.584$ OR: 1.4 [1.1, 1.8]
Panic Disorder (%) Valid N = 2222	6.8%	3.3%	$p = .001$ $X^2 = 11.547$ OR: 2.1 [1.4, 3.4]	$p = .007$** Wald $X^2 = 7.331$ OR: 1.9 [1.2, 3.0]

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A15. Cervical Post-Injury Axis II DSM-IV Diagnoses (N = 2145)

Axis II Variables	**Cervical Spine** n = 444 20.7%	**Lumbar Spine** n = 1701 79.3%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Any Cluster A Diagnosis at Admission Valid N = 2145	25.0%	23.0%	NS	NS
Any Cluster B Diagnosis at Admission Valid N = 2145	32.7%	37.0%	NS	p = .047** Wald X^2 = 3.947 OR: 1.3 [1.0, 1.6]
Any Cluster C Diagnosis at Admission Valid N = 2145	27.0%	24.3%	NS	NS

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.

** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A16. Cervical MMPI Clusters (N= 1533).

MMPI Clusters	**Cervical Spine** n = 310 20.2%	**Lumbar Spine** n = 1223 79.8%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
MMPI Normal Profile 0 Scale Elevations (%)	7.7%	7.8%	NS	NS
MMPI Disability Profile 4 or more scale elev. (%)	48.4%	49.4%	NS	NS
MMPI Conversion V Scale 1 & 3 elev. (%)	11.3%	11.9%	NS	NS
MMPI Neurotic Triad Scale 1,2,& 3 elev. (%)	9.4%	7.4%	NS	NS

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.

Table A17. Cervical Work Related Variables (N= 2495).

Work Related Variables	**Cervical Spine** n = 523 21.0%	**Lumbar Spine** n = 1972 79.0%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Work Status at Admission (% Yes) Valid N = 2495	13.6%	12.8%	NS	NS
Original Job Available (% Yes) Valid N = 1862	47.8%	48.8%	NS	NS
Job Satisfaction (PRE) 1- Very Satisfied 2- Satisfied 3- Neither 4- Dissatisfied 5- Very Dissatisfied Valid N = 1438	 57.9% 22.1% 11.5% 3.4% 5.0%	 57.4% 24.9% 11.9% 3.1% 2.7%	NS	NS
Job Code (% Blue) Valid N = 1875	67.2%	76.0%	$p < .001$ $X^2 = 12{,}881$ OR: 1.5 [1.2, 2.0]	NS
Job Demand 1- Sedentary /Light 2- Light/ Medium 3- Medium/Heavy 4- Heavy/Very Valid N = 2442	 15.5% 28.5% 33.2% 22.8%	 9.7 % 24.7% 38.6% 26.9%	For level 1 (Sedentary/Light) $p < .001$; $X^2 = 13.893$ For level 3 (Medium/Heavy) $p = .024$**; $X^2 = 5.091$	NS

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.

** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A18. Cervical One-Year Outcomes - (Completers Only) (N= 1859)

One Year Outcomes	**Cervical Spine** n = 401 21.6%	**Lumbar Spine** n = 1458 78.4%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Return to Work **1 Year (%)** Valid N = 1769	86.5%	88.3%	NS	NS
Work Retention **1 Year** Valid N = 1745	78.5%	81.6%	NS	NS
Treatment Seeking **1 Year** Valid N = 1773	24.3%	22.1%	NS	NS
Visits to New Provider **1 Year Mean(SD)** Valid N = 1773	2.6 (6.7)	2.0 (5.5)	NS	NS
New Surgery **To Original Site 1 Year** Valid N = 1769	3.1%	2.7%	NS	NS
Case Settlement **1 Year** Valid N = 1859	94.5%	96.4%	NS	NS

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.

Table A19. Lower Extremity Demographic Characteristics (N = 2042).

Demographic Variables	**Lower Extremity** n = 322 15.8%	**Lumbar Spine** n = 1720 84.2%	**Univariate Comparison**
Gender (% Male) Valid N = 2042	56.5%	61.6%	NS
Age Mean yr/(SD) Valid N = 2042	47.0 (10.2)	45.6 (9.7)	p = .027** t = 2.210 Cohen's d = 0.14
Ethnicity (%) African American Caucasian Hispanic Asian Other/Unknown Valid N = 2042	 21.4% 41.6% 18.3% 0.6% 18.0%	 20.8% 47.0% 18.7% 1.4% 12.2%	p = .037** X^2 = 10.204

** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A20. Lower Extremity Injury-Specific Variables (N = 2042).

Injury-Specific Variables	**Lower Extremity** n = 322 15.8%	**Lumbar Spine** n = 1720 84.2%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Completion Rate (%) Valid N = 2042	71.1%	73.4%	NS	NS
Temporary-Total Disability Months/(SD) Valid N = 1720	15.0 (19.0)	16.1 (21.0)	NS	NS
Length of Disability Months/(SD) Valid N = 2042	17.9 (21.5)	19.9 (29.2)	NS	NS
Pretreatment Surgeries (%) Valid N = 1983	66.0%	32.5%	$p < .001$ $X^2 = 125.756$ OR= 4.0 [3.1, 5.2]	$p < .001$ Wald $X^2 = 115.059$ OR= 4.1 [3.2, 5.3]
Attorney Retained (%) Valid N = 1935	20.4%	20.7%	NS	NS
Case Settlement – Pre-treatment (%) Valid N = 1984	29.8%	28.8%	NS	NS
Compensable Body Parts Mean (SD) Valid N = 2042	1.5 (0.9)	1.5 (0.8)	NS	NS

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.

Table A21. Lower Extremity Pre-Treatment Psychosocial Variables (N= 1964)

Psychosocial Variables (Pre-Treatment)	Lower Extremity n = 322 15.8%	Lumbar Spine n = 1720 84.2%	Univariate Comparison	Single-Variable Comparison (Controlling for Demographic Variables)*
BDI X/(SD) Valid N = 1956	16.5 (11.4)	18.8 (11.1)	*p* = .001 *t* = 3.373 Cohen's *d* = 0.20	*p* < .001 Wald X^2 = 12.703 OR= 1.02 [1.01, 1.04] (per unit increase)
Pain Intensity X/(SD) Valid N = 1964	6.5 (2.0)	6.9 (3.7)	NS	*p* =.003** Wald X^2 = 8.734 OR= 1.1 [1.0, 1.2] (per unit increase)
MVAS X/(SD) Valid N = 1944	93.7 (24.7)	98.7 (22.7)	*p* = .001 *t* = 3.297 Cohen's *d* = 0.21	*p* < .001 Wald X^2 = 15.450 OR= 1.01 [1.0, 1.02] (per unit increase)
PDQ X/(SD) Valid N= 739	99.5 (24.6)	103.6 (23.3)	NS	*p* = .038** Wald X^2 = 4.310 OR= 1.0 [1.0, 1.02] (per unit increase)
Functional	59.6 (15.4)	61.9 (14.7)	NS	NS
Psychosocial	39.9 (12.3)	41.9 (12.5)	NS	NS
SF-36 Summary X/(SD) Valid N = 1185				
Mental Health	39.3 (11.0)	38.9 (9.8)	NS	NS
Physical Health	29.2 (5.7)	29.2 (5.7)	NS	NS

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.

** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A22. Lower Extremity Post-Injury Axis I DSM-IV Diagnoses (N = 1863)

Axis I Variables	**Lower Extremity** n = 294 15.8%	**Lumbar Spine** n = 1569 84.2%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Mood Disorder (%)	54.1%	53.6%	NS	NS
Major Depressive Disorder (%)	52.7%	53.1%	NS	NS
Substance Use Disorder (%)	17.0%	23.1%	*p* = .021** X^2 = 5.288 OR= 1.5 [1.1, 2.0]	*p* = .040** Wald X^2 = 4.217 OR= 1.4 [1.0, 2.0]
Alcohol Dependency	1.7%	1.6%	NS	NS
Opioid Dependency	15.3%	20.5%	*p* = .041** X^2 = 4.164 OR= 1.4 [1.0, 2.0]	*p* = .030** Wald X^2 = 4.706 OR= 1.5 [1.0, 2.1]
Anxiety Disorder (%)	18.0%	15.7%	NS	NS
Panic Disorder (%)	4.4%	4.4%	NS	NS

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A23. Lower Extremity Post-Injury Axis II DSM-IV Diagnoses (N = 1754)

Axis II Variables	**Lower Extremity** n = 272 15.5%	**Lumbar Spine** n = 1482 84.5%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Any Cluster A Diagnosis at Admission	16.2%	20.7%	NS	NS
Any Cluster B Diagnosis at Admission	31.6%	34.5%	NS	NS
Any Cluster C Diagnosis at Admission	18.0%	24.4%	p = .023** X^2 = 5.164 OR: 1.5 [1.1, 2.0]	p = .031** Wald X^2 = 4.656 OR: 1.4 [1.0, 2.0]

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.

** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A24. Lower Extremity MMPI Clusters (N= 1187).

MMPI Clusters	**Lower Extremity** n = 162 13.6%	**Lumbar Spine** n = 1025 86.4%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
MMPI Normal Profile 0 Scale Elevations (%)	13.0%	7.4%	*p* = .017** X^2 = 5.739 OR= 1.9 [1.1, 3.1]	*p* = .020** Wald X^2 = 5.391 OR= 1.9 [1.1, 3.1]
MMPI Disability Profile 4 or more scale elev. (%)	45.7%	49.7%	NS	NS
MMPI Conversion V Scale 1 & 3 elev. (%)	9.3%	12.2%	NS	NS
MMPI Neurotic Triad Scale 1,2,& 3 elev. (%)	8.6%	7.2%	NS	NS

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A25. Lower Extremity Work Related Variables (N= 1987).

Work Related Variables	**Lower Extremity** n = 307 15.5%	**Lumbar Spine** n = 1680 84.5%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Work Status at Admission (% Yes)	14.3%	12.2%	NS	NS
Original Job Available (% Yes)	52.9%	49.2%	NS	NS
Job Satisfaction (PRE) 1- Very Satisfied 2- Satisfied 3- Neither 4- Dissatisfied 5- Very Dissatisfied	 66.0% 18.1% 10.1% 2.5% 3.4%	 57.2% 25.0% 12.6% 2.8% 2.5%	 NS	 NS
Job Code (% Blue)	74.9%	74.5%	NS	NS
Job Demand 1- Sedentary /Light 2- Light/ Medium 3- Medium/Heavy 4- Heavy/Very	 15.0% 28.3% 31.3% 25.4%	 9.0 % 25.0% 38.9% 27.1%	 p = .002 X^2 = 14.561 OR for levels 3/4: 1.5 [1.2, 1.9]	 p = .019** Wald X^2 = 5.485 OR for levels 3/4: 1.4 [1.1, 1.8]

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A26. Lower Extremity One-Year Outcomes (Completers Only) (N= 1392)

One Year Outcomes	**Lower Extremity** n = 207 14.9%	**Lumbar Spine** n = 1185 85.1%	**Univariate Comparison**	**Single-Variable Comparison** (Controlling for Demographic Variables)*
Return to Work 1 Year (%) Valid N = 1615	87.0%	88.5%	NS	NS
Work Retention 1 Year Valid N = 1293	82.3%	81.2%	NS	NS
Treatment Seeking 1 Year Valid N = 1341	16.0%	20.8%	NS	NS
Visits to New Provider 1 Year Mean(SD) Valid N = 1341	1.7 (5.8)	2.1 (5.9)	NS	NS
New Surgery To Original Site 1 Year Valid N = 1328	3.5%	2.5%	NS	NS
Case Settlement 1 Year Valid N = 1392	96.1%	97.6%	NS	NS

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.

Table A27. Lower Extremity Specific Body Region and Lumbar One-Year Outcomes - (Completers Only)

One Year Outcomes	**Multiple LE** n = 25 1.6% L-LE 11.4% LE	**Hip** n = 11 0.1% L-LE 0.5% LE	**Knee** n = 140 9.4% L-LE 63.9% LE	**Ankle** n = 25 1.6% L-LE 11.4% LE	**Foot** n = 18 1.2% L-LE 8.2% LE	**LE Comparison**	**Lumbar Spine** n = 1267 85.3% L-LE	**Lumbar-LE Compariso n**
Completion Rate	73.5%	57.9%	72.9%	73.5%	72.0%	NS	73.7%	NS
Return to Work 1 Year (%)	77.8%	100.0%	89.0%	81.8%	85.7%	NS	88.5%	NS
Work Retention 1 Year	77.8%	87.5%	83.5%	81.8%	85.7%	NS	81.2%	NS
Treatment Seeking 1 Year	5.0%	12.5%	18.1%	9.1%	21.4%	NS	20.8%	NS
Visits to New Provider 1 Year Mean(SD)	0.2 (0.7)	0.4 (1.1)	2.1 (6.6)	0.7 (2.8)	1.4 (2.9)	NS	2.1 (5.9)	NS
New Surgery To Original Site 1 Year	5.6%	0.0%	3.9%	0.0%	0.0%	NS	2.5%	NS
Case Settlement 1 Year	100.0%	100.0%	96.9%	95.5%	87.5%	NS	97.6%	NS

Table A28. Multiple Site Demographic Characteristics (N = 3175).

Demographic Variables	**Multiple Site Including Lumbar** n = 993 31.3%	**Multiple Site Excluding Lumbar** n = 597 13.4%	**Pure Lumbar Spine** n = 1585 49.9%	**Univariate Comparison**
Gender (% Male)	51.5%	42.9%	66.5%	$p < .001$ $X^2 = 119.417$
Age Mean yr/(SD)	46.5 (10.2)	46.3 (9.6)	44.2 (9.8)	$p < .001$ F = 18.930
Ethnicity (%)				
African American	20.9%	21.3%	15.6%	$p = .002$ $X^2 = 24.979$
Caucasian	50.3%	48.9%	54.1%	
Hispanic	17.1%	15.7%	19.4%	
Asian	0.9%	1.2%	1.3%	
Other / Unknown	10.8%	12.9%	9.7%	

Table A29. Multiple Site Injury-Specific Variables (N = 3175).

Injury-Specific Variables	**Multiple Site Including Lumbar** n = 993 31.3%	**Multiple Site Excluding Lumbar** n = 597 13.4%	**Pure Lumbar Spine** n = 1585 49.9%	**Univariate Comparison** (All 3 Groups)	**Lumbar/ MS with Lumbar*** (controlling for demographics)	**Lumbar/ MS without Lumbar*** (controlling for demographics)
Completion Rate (%) Valid N = 3175	76.3%	79.1%	80.6%	p = .037** X^2 = 6.591	p = .025** Wald X^2 = 5.046 OR= 1.3 [1.0, 1.5]	NS
Temporary-Total Disability Months/(SD) Valid N = 2102	15.2 (19.3)	15.7 (17.5)	16.4 (20.8)	NS	NS	NS
Length of Disability Months/(SD) Valid N = 3170	16.8 (27.5)	18.9 (21.2)	19.8 (26.8)	p = .019** F = 3.966	p = .006** Wald X^2 = 7.452	NS
Pretreatment Surgeries (%) Valid N = 3090	31.2%	52.5%	33.2%	p < .001 X^2 = 82.965	NS	p < .001 Wald X^2 = 78.874 OR= 2.4 [2.0, 2.9]
Attorney Retained (%) Valid N = 3025	24.1%	20.0%	19.3%	p = .016** X^2 = 8.298	p = .004** Wald X^2 = 8.208 OR= 1.4 [1.1, 1.6]	NS
Case Settlement – Pre-treatment (%) Valid N = 3076	27.7%	28.2%	27.6%	NS	NS	NS
Compensable Body Parts Mean (SD) Valid N = 3175	2.6 (0.9)	2.5 (0.7)	1.0 (0.0)			

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A30. Multiple Site Pre-Treatment Psychosocial Variables (N= 3077)

Psychosocial Variables (Pre-Treatment)	**Multiple Site Including Lumbar** n = 960 31.2%	**Multiple Site Excluding Lumbar** n = 578 18.8%	**Pure Lumbar Spine** n = 1539 50.0%	**Univariate Comparison**	**Lumbar/ MS with Lumbar*** (controlling for demographics)	**Lumbar/ MS without Lumbar*** (controlling for demographics)
BDI X/(SD) Valid N = 3058	19.4 (11.3)	17.9 (11.0)	17.5 (10.6)	$p < .001$ F = 8.629	$p = .047$** Wald $X^2 = 3.931$	NS
Pain Intensity X/(SD) Valid N = 3073	6.9 (1.8)	6.7 (2.0)	6.7 (1.9)	$p = .001$ F = 7.598	NS	NS
MVAS X/(SD) Valid N = 3050	98.9 (22.0)	86.6 (26.7)	96.2 (23.9)	$p < .001$ F = 49.771	$p = .040$** Wald $X^2 = 4.228$	$p < .001$ Wald $X^2 = 63.645$
PDQ X/(SD) Valid N= 906	103.7 (24.3)	96.7 (25.6)	103.7 (23.2)	$p = .002$ F = 6.542	NS	$p < .001$ Wald $X^2 = 13.189$
Functional	60.9 (16.2)	57.5 (15.8)	62.5 (14.0)	$p = .001$ F = 7.378	NS	$p = .025$** Wald $X^2 = 5.011$
Psychosocial	42.7 (13.2)	39.2 (12.1)	41.4 (11.7)	$p = .008$** F = 4.843	NS	NS
SF-36 Summary X/(SD) Valid N = 1443 Mental Health	38.4 (10.1)	38.6 (9.6)	39.1 (9.7)	NS	NS	NS
Physical Health	29.0 (5.5)	31.6 (14.9)	29.2 (5.9)	$p < .001$ F = 10.328	NS	$p = .003$** Wald $X^2 = 8.630$

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A31. Multiple Site Post-Injury Axis I DSM-IV Diagnoses (N = 2826)

Axis I Variables	**Multiple Site Including Lumbar** n = 882 31.2%	**Multiple Site Excluding Lumbar** n = 532 18.8%	**Pure Lumbar Spine** n = 1412 50.0%	**Univariate Comparison**	**Lumbar/ MS with Lumbar*** (controlling for demographics)	**Lumbar/ MS without Lumbar*** (controlling for demographics)
Mood Disorder (%)	60.9%	60.2%	49.5%	$p < .001$ $X^2 = 35.277$	$p < .001$ Wald $X^2 = 19.687$ OR: 1.5 [1.2, 1.8]	$p = .004$** Wald $X^2 = 8.488$ OR: 1.4 [1.1, 1.7]
Major Depressive Disorder (%)	60.4%	59.2%	49.1%	$p < .001$ $X^2 = 34.006$	$p < .001$ Wald $X^2 = 19.622$ OR: 1.5 [1.2, 1.8]	$p = .006$** Wald $X^2 = 7.432$ OR: 1.3 [1.1, 1.6]
Substance Use Disorder (%)	20.2%	16.4%	22.9%	$p = .005$** $X^2 = 10.519$	NS	$p = .011$** Wald $X^2 = 6.474$ OR= 1.4 [1.1, 1.8]
Alcohol Dependency	1.4%	1.1%	1.6%	NS	NS	NS
Opioid Dependency	18.4%	15.0%	20.3%	$p = .027$** $X^2 = 7.206$	NS	$p = .027$** Wald $X^2 = 4.899$ OR= 1.4 [1.0, 1.8]
Anxiety Disorder (%)	17.2%	18.2%	11.5%	$p < .001$ $X^2 = 21.673$	$p = .002$ Wald $X^2 = 9.345$ OR= 1.2 [1.5, 1.9]	$p = .007$** Wald $X^2 = 7.220$ OR= 1.5 [1.1, 2.0]
Panic Disorder (%)	5.2%	6.4%	3.1%	$p = .003$** $X^2 = 11.971$	NS	$p = .032$** Wald $X^2 = 5.589$ OR= 1.7 [1.0, 2.7]

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A32. Multiple Site Post-Injury Axis II DSM-IV Diagnoses (N = 2708)

Axis II Variables	**Multiple Site Including Lumbar** n = 838 30.9%	**Multiple Site Excluding Lumbar** n = 506 18.7%	**Pure Lumbar Spine** n = 1364 50.4%	**Univariate Comparison**	**Lumbar/ MS with Lumbar*** (controlling for demographics)	**Lumbar/ MS without Lumbar*** (controlling for demographics)
Any Cluster A Diagnosis at Admission	23.0%	23.9%	23.7%	NS	NS	NS
Any Cluster B Diagnosis at Admission	38.7%	32.4%	36.7%	NS	NS	p = .023** Wald X^2 = 5.178 OR= 1.3 [1.0, 1.6]
Any Cluster C Diagnosis at Admission	25.2%	25.9%	25.0%	NS	NS	NS

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A33. Multiple Site MMPI Clusters (N= 1908).

MMPI Clusters	**Multiple Site Including Lumbar** n = 574 30.1%	**Multiple Site Excluding Lumbar** n = 334 17.5%	**Pure Lumbar Spine** n = 1000 52.4%	**Univariate Comparison**	**Lumbar/ MS with Lumbar*** (controlling for demographics)	**Lumbar/ MS without Lumbar*** (controlling for demographics)
MMPI Normal Profile 0 Scale Elevations (%)	5.9%	8.4%	7.9%	NS	NS	NS
MMPI Disability Profile 4 or more scale elev. (%)	57.8%	49.7%	49.2%	p = .003** X^2 = 11.679	p = .002 Wald X^2 = 9.714 OR= 1.4 [1.1, 1.7]	NS
MMPI Conversion V Scale 1 & 3 elev. (%)	9.6%	9.6%	11.9%	NS	NS	NS
MMPI Neurotic Triad Scale 1,2,& 3 elev. (%)	7.8%	7.8%	7.1%	NS	NS	NS

*Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A34. Multiple Site Work Related Variables (N= 3175).

Work Related Variables	**Multiple Site Including Lumbar** n = 993 31.3%	**Multiple Site Excluding Lumbar** n = 597 13.4%	**Pure Lumbar Spine** n = 1585 49.9%	**Univariate Comparison**	**Lumbar/ MS with Lumbar*** (controlling for demographics)	**Lumbar/ MS without Lumbar*** (controlling for demographics)
Work Status at Admission (% Yes) Valid N = 3175	12.1 %	13.9%	13.1%	NS	NS	NS
Original Job Available (% Yes) Valid N = 2384	46.7%	48.3%	49.0%	NS	NS	NS
Job Satisfaction (PRE) 1- Very Satisfied 2- Satisfied 3- Neither 4- Dissatisfied 5- Very Dissatisfied Valid N = 1872	 58.7% 22.8% 12.9% 3.1% 2.6%	 60.7% 22.4% 9.4% 4.1% 3.3%	 57.2% 25.6% 11.9% 2.8% 2.5%	NS	NS	NS
Job Code (% Blue) Valid N = 2400	69.4%	66.9%	76.6%	$p < .001$ $X^2 = 21.232$	NS	NS
Job Demand 1- Sedentary /Light 2- Light/ Medium 3- Medium/Heavy 4- Heavy/Very Valid N = 3104	 14.9% 27.0% 35.7% 22.4%	 22.4% 28.1% 32.0% 17.6%	 8.5% 24.7% 39.8% 27.0%	$p < .001$ $X^2 = 92.327$	NS	$p = .002$ Wald $X^2 = 9.941$ OR for levels 3/4: 1.4 [1.1, 1.8]

*Multinomial Logistic Regression analyses utilized to control for Gender and Ethnicity.

Table A35. Multiple Site One-Year Outcomes - (Completers Only) (N= 2208)

One Year Outcomes	**Multiple Site Including Lumbar** n = 667 30.2%	**Multiple Site Excluding Lumbar** n = 424 19.2%	**Pure Lumbar Spine** n = 1117 50.6%	**Univariate Comparison**	**Lumbar/ MS with Lumbar** (controlling for demographics)	**Lumbar/ MS without Lumbar** (controlling for demographics)
Return to Work 1 Year (%) Valid N = 2208	88.5%	86.1%	88.0%	NS	NS	NS
Work Retention 1 Year Valid N = 2178	82.1%	78.8%	81.0%	NS	NS	NS
Treatment Seeking 1 Year Valid N = 2218	22.5%	23.1%	22.3%	NS	NS	NS
Visits to New Provider 1 Year Mean(SD) Valid N = 2218	2.2 (6.1)	2.3 (6.4)	2.0 (5.6)	NS	NS	NS
New Surgery To Original Site 1 Year Valid N = 2222	1.8%	3.5%	2.8%	NS	NS	NS
Case Settlement 1 Year Valid N = 2329	96.0%	94.8%	96.1%	NS	NS	NS

*Multinomial Logistic Regression analyses utilized to control for Gender and Ethnicity.

Table A36. Upper Extremity/Lumbar Multivariate Logistic Regression Model: Block 1

Block 1 **Block X^2 = 25.003; p < .001** **Nagelkerke R^2 = .057**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Race Black	-.384	.273	1.974	1	.160	.681	.399	1.164
Race Hispanic	-.466	.280	2.771	1	.096	.628	.363	1.086
Race Other/Unknown	-.394	.219	3.246	1	.072	.674	.439	1.035
Gender Female	.805	.180	20.029	1	.000	2.237	1.572	3.182
Constant	-.168	.482	.121	1	.728	.845		

Table A37. Upper Extremity/Lumbar Multivariate Logistic Regression Model: Block 2

Block 2 **Block X^2 = 85.756; p < .001** **Nagelkerke R^2 = .237**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Race Black	-.432	.296	2.132	1	.144	.649	.364	1.159
Race Hispanic	-.301	.304	.978	1	.323	.740	.408	1.344
Race Other/Unknown	-.295	.236	1.557	1	.212	.745	.469	1.183
Gender Female	1.006	.225	19.936	1	.000	2.734	1.758	4.252
Length of Disability	-.013	.004	10.828	1	.001	.987	.979	.995
No Pre-Treatment Surgery	-1.680	.218	59.539	1	.000	.186	.122	.286
Compensable Body Parts	.485	.112	18.740	1	.000	1.624	1.304	2.024
Job Demand: Medium – Very Heavy	-.076	.223	.114	1	.735	.927	.598	1.437
Constant	-.013	.562	.001	1	.981	.987		

Table A38. Upper Extremity/Lumbar Multivariate Logistic Regression Model: Block 3

Block 3 **Block X^2 = 76.540; $p < .001$** **Nagelkerke R^2 = .377**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Race Black	-.627	.324	3.747	1	.053	.534	.283	1.008
Race Hispanic	-.130	.327	.157	1	.692	.878	.463	1.667
Race Other/Unknown	-.251	.260	.932	1	.334	.778	.467	1.295
Gender Female	1.297	.250	26.840	1	.000	3.660	2.240	5.979
Length of Disability	-.012	.004	7.979	1	.005	.988	.980	.996
No Pre-Treatment Surgery	-1.823	.238	58.837	1	.000	.162	.101	.257
Compensable Body Parts	.487	.123	15.734	1	.000	1.628	1.280	2.071
Job Demand: Medium – Very Heavy	-.189	.244	.601	1	.438	.828	.513	1.335
Beck Depression Inventory	-.001	.011	.011	1	.916	.999	.978	1.020
Million Visual Analog Scale	-.047	.008	37.425	1	.000	.954	.940	.969
Pain Intensity Analog	.142	.073	3.765	1	.052	1.152	.999	1.329
Pain Disability Quest. Functional	.016	.010	2.469	1	.116	1.016	.996	1.035
Pain Disability Quest. Psychosocial	.019	.011	3.291	1	.070	1.020	.998	1.041
SF-36 Physical Component Summary	.053	.020	7.370	1	.007	1.055	1.015	1.096
Constant	.163	1.081	.023	1	.880	1.177		

Table A39. Upper Extremity/Lumbar Multivariate Logistic Regression Model: Final Block

Block 4 **Block X^2 = 1.946; p = NS** **Nagelkerke R^2 = .380**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Race Black	-.591	.325	3.309	1	.069	.554	.293	1.047
Race Hispanic	-.082	.330	.061	1	.805	.922	.483	1.758
Race Other/Unknown	-.195	.264	.546	1	.460	.823	.491	1.380
Gender Female	1.257	.252	24.798	1	.000	3.515	2.143	5.765
Length of Disability	-.011	.004	6.890	1	.009	.989	.980	.997
No Pre-Treatment Surgery	-1.838	.238	59.610	1	.000	.159	.100	.254
Compensable Body Parts	.476	.123	14.972	1	.000	1.610	1.265	2.050
Job Demand: Medium – Very Heavy	-.168	.245	.472	1	.492	.845	.523	1.366
Beck Depression Inventory	-.001	.011	.014	1	.906	.999	.978	1.020
Million Visual Analog Scale	-.046	.008	36.332	1	.000	.955	.940	.969
Pain Intensity Analog	.143	.073	3.839	1	.050	1.154	1.000	1.332
Pain Disability Quest. Functional	.017	.010	2.794	1	.095	1.017	.997	1.037
Pain Disability Quest. Psychosocial	.021	.011	3.662	1	.056	1.021	1.000	1.043
SF-36 Physical Component Summary	.052	.020	7.040	1	.008	1.053	1.014	1.095
Opioid Dependence	.390	.283	1.906	1	.167	1.477	.849	2.570
Constant	-.375	1.147	.107	1	.744	.687		

Table A40. Cervical Spine/Lumbar Multivariate Logistic Regression Model: Block 1

Block 1 **Block X^2 = 28.399; p < .001** **Nagelkerke R^2 = .046**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Gender Female	.739	.162	20.728	1	.000	2.093	1.523	2.877
Age	.019	.009	4.995	1	.025	1.019	1.002	1.036
Race Black	.117	.209	.313	1	.576	1.124	.747	1.692
Race Hispanic	-.006	.229	.001	1	.979	.994	.635	1.557
Race Other/Unknown	-.266	.712	.140	1	.708	.766	.190	3.094
Constant	-2.601	.968	7.224	1	.007	.074		

Table A41. Cervical Spine/Lumbar Multivariate Logistic Regression Model: Block 2

Block 2 **Block X^2 = 96.177; $p < .001$** **Nagelkerke R^2 = .192**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Gender Female	.706	.202	12.244	1	.000	2.025	1.364	3.007
Age	.010	.009	1.249	1	.264	1.010	.992	1.029
Race Black	.163	.226	.523	1	.470	1.177	.756	1.832
Race Hispanic	.070	.250	.078	1	.780	1.072	.657	1.751
Race Other/Unknown	-.596	.739	.651	1	.420	.551	.129	2.345
No Pre Treatment Surgery	-.530	.176	9.089	1	.003	.589	.417	.831
Compensable Body Parts	.877	.102	74.298	1	.000	2.404	1.969	2.934
Job Code: White	-.138	.203	.463	1	.496	.871	.586	1.296
Job Demand: Medium – Very Heavy	-.068	.203	.111	1	.739	.935	.628	1.391
Constant	-3.017	1.042	8.386	1	.004	.049		

Table A42. Cervical Spine/Lumbar Multivariate Logistic Regression Model: Block 3

Block 3 **Block X^2 = 9.906; p = .007** **Nagelkerke R^2 = .206**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Gender Female	.750	.204	13.575	1	.000	2.118	1.421	3.157
Age	.011	.009	1.521	1	.217	1.011	.993	1.030
Race Black	.111	.227	.240	1	.624	1.118	.716	1.745
Race Hispanic	.103	.252	.166	1	.684	1.108	.677	1.814
Race Other/Unknown	-.615	.738	.695	1	.405	.541	.127	2.296
No Pre Treatment Surgery	-.547	.177	9.533	1	.002	.579	.409	.819
Compensable Body Parts	.869	.103	71.730	1	.000	2.384	1.950	2.914
Job Code: White	-.115	.204	.317	1	.573	.891	.598	1.330
Job Demand: Medium – Very Heavy	-.070	.204	.117	1	.732	.933	.625	1.391
Million Visual Analog Scale	-.008	.004	4.647	1	.031	.992	.985	.999
SF-36 Physical Component Summary	.018	.013	1.812	1	.178	1.018	.992	1.044
Constant	-2.775	1.217	5.202	1	.023	.062		

Table A43. Cervical Spine/Lumbar Multivariate Logistic Regression Model: Final Block

Block 4 **Block X^2 = 10.888; p = NS** **Nagelkerke R^2 = .222**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Gender Female	.661	.209	10.019	1	.002	1.936	1.286	2.915
Age	.012	.009	1.792	1	.181	1.013	.994	1.031
Race Black	.132	.232	.324	1	.569	1.141	.724	1.800
Race Hispanic	.101	.255	.157	1	.692	1.106	.671	1.823
Race Other/Unknown	-.659	.733	.810	1	.368	.517	.123	2.174
No Pre Treatment Surgery	-.493	.180	7.488	1	.006	.611	.429	.870
Compensable Body Parts	.867	.104	69.164	1	.000	2.380	1.940	2.919
Job Code: White	-.073	.207	.126	1	.723	.929	.620	1.393
Job Demand: Medium – Very Heavy	-.083	.207	.161	1	.688	.920	.613	1.381
Million Visual Analog Scale	-.009	.004	5.716	1	.017	.991	.983	.998
SF-36 Physical Component Summary	.018	.013	2.004	1	.157	1.018	.993	1.043
Mood Disorder	-.997	.950	1.100	1	.294	.369	.057	2.377
Major Depressive Disorder	.856	.943	.823	1	.364	2.353	.370	14.949
Anxiety Disorder	-.041	.265	.024	1	.876	.959	.571	1.613
Panic Disorder (none)	-.903	.393	5.287	1	.021	.405	.188	.875
Any Cluster B Personality Diagonosis	.253	.198	1.633	1	.201	1.288	.874	1.900
Constant	-2.023	1.295	2.440	1	.118	.132		

Table A44. Lower Extremity/Lumbar Multivariate Logistic Regression Model: Block 1

Block 1 **Block X^2 = 7.756; p = NS** **Nagelkerke R^2 = .021**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Gender Female	-.116	.216	.290	1	.590	.890	.583	1.359
Age	.018	.011	2.740	1	.098	1.018	.997	1.040
Race Black	.371	.314	1.398	1	.237	1.450	.783	2.683
Race Hispanic	.284	.318	.797	1	.372	1.328	.712	2.476
Race Other / Unknown	-.014	.265	.003	1	.958	.986	.587	1.656
Constant	-2.595	1.974	.000	1	.999	.000		

Table A45. Lower Extremity/Lumbar Multivariate Logistic Regression Model: Block 2

Block 2 **Block X^2 = 32.271; p < .001** **Nagelkerke R^2 = .106**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Gender Female	-.158	.251	.397	1	.529	.854	.523	1.396
Age	.014	.011	1.428	1	.232	1.014	.991	1.037
Race Black	.340	.323	1.106	1	.293	1.405	.746	2.646
Race Hispanic	.243	.328	.546	1	.460	1.274	.670	2.426
Race Other / Unknown	-.052	.274	.036	1	.850	.949	.555	1.623
No Pre Treatment Surgery	-1.198	.223	28.808	1	.000	.302	.195	.468
Job Demand: Medium to Very Heavy	.278	.248	1.253	1	.263	1.320	.812	2.146
Constant	-2.529	1.457	.000	1	.999	.000		

Table A46. Lower Extremity/Lumbar Multivariate Logistic Regression Model: Block 3

Block 3 **Block X^2 = 5.876; p = NS** **Nagelkerke R^2 = .121**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Gender Female	-.175	.259	.458	1	.499	.839	.505	1.394
Age	.013	.011	1.343	1	.246	1.013	.991	1.036
Race Black	.298	.327	.829	1	.363	1.347	.710	2.556
Race Hispanic	.270	.332	.660	1	.417	1.310	.683	2.513
Race Other / Unknown	-.046	.277	.028	1	.868	.955	.555	1.643
No Pre Treatment Surgery	-1.256	.227	30.629	1	.000	.285	.182	.444
Job Demand: Medium to Very Heavy	.261	.251	1.081	1	.298	1.298	.794	2.122
Beck Depression Inventory	-.012	.012	.951	1	.329	.989	.966	1.012
Million Visual Analog Scale	.006	.008	.540	1	.462	1.006	.990	1.023
Pain Intensity Analog	.023	.076	.093	1	.761	1.024	.881	1.189
Pain Disability Quest. Psychosocial	-.011	.007	2.427	1	.119	.989	.975	1.003
Constant	-2.878	1.689	.000	1	.999	.000		

Table A47. Lower Extremity/Lumbar Multivariate Logistic Regression Model: Final Block

Block 4 **Block X^2 = 10.646; p = .005** **Nagelkerke R^2 = .148**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Gender Female	-.121	.263	.213	1	.644	.886	.529	1.482
Age	.015	.011	1.764	1	.184	1.015	.993	1.038
Race Black	.412	.334	1.521	1	.217	1.509	.785	2.903
Race Hispanic	.360	.339	1.132	1	.287	1.434	.738	2.785
Race Other / Unknown	.148	.284	.271	1	.603	1.160	.664	2.025
No Pre Treatment Surgery	-1.372	.233	34.701	1	.000	.254	.161	.400
Job Demand: Medium to Very Heavy	.295	.254	1.348	1	.246	1.343	.816	2.208
Beck Depression Inventory	-.007	.012	.331	1	.565	.993	.970	1.017
Million Visual Analog Scale	.007	.009	.682	1	.409	1.007	.990	1.024
Pain Intensity Analog	.035	.078	.198	1	.656	1.035	.889	1.206
Pain Disability Quest. Psychosocial	-.011	.007	2.088	1	.148	.989	.975	1.004
Opioid Dependence (none)	.736	.271	7.364	1	.007	2.089	1.227	3.555
Any Cluster C Personality Disorder	.505	.328	2.368	1	.124	1.658	.871	3.156
Constant	-2.438	2.823	.000	1	.999	.000		

Table A48. Multiple Site Including Lumbar / Pure Lumbar Simultaneous Multinomial Logistic Regression Model

Final Model **Model Fit X^2 = 156.755; p < .001** **Nagelkerke R^2 = .231**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Intercept	-2.090	1.056	3.918	1	.048			
Age	.048	.010	21.389	1	.000	1.049	1.028	1.070
Length of Disability	-.006	.004	2.560	1	.110	.994	.987	1.001
Beck Depression Inventory	.004	.010	.119	1	.730	1.004	.983	1.024
Million Visual Analog Scale	-.002	.007	.045	1	.832	.998	.985	1.013
Pain Intensity Analog	.104	.063	2.692	1	.101	1.109	.980	1.256
Pain Disability Quest. Functional	-.016	.009	2.990	1	.084	.984	.967	1.002
Pain Disability Quest. Psychosocial	.008	.011	.604	1	.437	1.008	.987	1.030
Gender Female	.688	.216	10.155	1	.001	1.989	1.303	3.037
Race Black	-.377	.261	2.086	1	.149	.686	.412	1.144
Race Hispanic	-.144	.273	.278	1	.598	.866	.507	1.479
Race Other / Unknown	-.052	.255	.042	1	.837	.949	.576	1.564
No Pre Treatment Surgery	.088	.215	.166	1	.684	1.092	.716	1.665
Attorney Retention	-.072	.219	.109	1	.742	.930	.606	1.429
Mood Disorder	.151	1.262	.014	1	.905	1.163	.098	13.797
Major Depression Disorder	-.610	1.257	.236	1	.627	.543	.046	6.381
Opioid Dependence	.001	.218	.000	1	.998	1.001	.653	1.533
Anxiety Disorder	-.136	.235	.336	1	.562	.872	.550	1.384
Panic Disorder	.156	.392	.158	1	.691	1.168	.542	2.517
Any Cluster B Personality Disorder	-.304	.219	1.936	1	.164	.738	.481	1.132
Job Demand: Medium – Very Heavy	.218	.211	1.065	1	.302	1.243	.822	1.879

Table A49. Multiple Site Excluding Lumbar / Pure Lumbar Simultaneous Multinomial Logistic Regression Model

Final Model **Model Fit X^2 = 156.755; p < .001** **Nagelkerke R^2 = .231**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Intercept	1.483	1.194	1.542	1	.214			
Age	.015	.012	1.581	1	.209	1.015	.992	1.038
Length of Disability	-.007	.004	2.786	1	.095	.993	.984	1.001
Beck Depression Inventory	-.003	.012	.050	1	.823	.997	.973	1.022
Million Visual Analog Scale	-.031	.008	16.297	1	.000	.969	.955	.984
Pain Intensity Analog	.129	.072	3.246	1	.072	1.138	.989	1.310
Pain Disability Quest. Functional	-.003	.011	.091	1	.763	.997	.977	1.018
Pain Disability Quest. Psychosocial	.004	.013	.085	1	.771	1.004	.979	1.029
Gender Female	1.107	.255	18.789	1	.000	3.024	1.833	4.987
Race Black	-.509	.303	2.822	1	.093	.601	.332	1.088
Race Hispanic	.201	.330	.370	1	.543	1.222	.640	2.335
Race Other / Unknown	.073	.293	.062	1	.803	1.076	.605	1.912
No Pre Treatment Surgery	-1.192	.246	23.559	1	.000	.304	.188	.491
Attorney Retention	-.288	.253	1.294	1	.255	.750	.456	1.232
Mood Disorder	-.610	1.015	.361	1	.548	.543	.074	3.975
Major Depression Disorder	-.065	1.003	.004	1	.948	.937	.131	6.696
Opioid Dependence (none)	.552	.276	4.008	1	.045	1.737	1.012	2.984
Anxiety Disorder	-.101	.279	.131	1	.717	.904	.523	1.562
Panic Disorder	-.303	.426	.505	1	.477	.739	.320	1.703
Any Cluster B Personality Disorder	.133	.274	.236	1	.627	1.142	.668	1.955
Job Demand: Medium – Very Heavy	.269	.245	1.210	1	.271	1.309	.810	2.115

Table A50. Overall Simultaneous Multinomial Logistic Regression Model:
Risk Factors for Upper Extremity, Cervical and Lower Extremity Injuries Compared to Pure Lumbar Cohort

Upper Extremity **Model Fit X^2 = 202.488; p < .001** **Nagelkerke R^2 = .334**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Intercept	-0.099	1.647	0.004	1	0.952			
Age	0.01	0.013	0.583	1	0.445	1.01	0.985	1.035
Length of Disability	-0.011	0.005	5.976	1	0.014	0.989	0.98	0.998
Beck Depression Inventory	0.00	0.013	0.00	1	0.990	1.00	0.974	1.026
Million Visual Analog Scale	-0.047	0.008	32.096	1	0.000	0.954	0.939	0.97
Pain Intensity Analog	0.218	0.079	7.65	1	0.006	1.244	1.066	1.452
SF-36 Physical Component Summary	0.059	0.02	8.73	1	0.003	1.061	1.02	1.103
Pain Disability Questionnaire Total	0.01	0.008	1.514	1	0.219	1.01	0.994	1.025
Gender Female	1.257	0.284	19.535	1	0.000	3.515	2.013	6.137
Race Black	-0.587	0.348	2.835	1	0.092	0.556	0.281	1.101
Race Hispanic	-0.211	0.357	0.349	1	0.555	0.81	0.402	1.63
Race Other / Unknown	0.032	0.31	0.011	1	0.918	1.033	0.562	1.897
No Pre-Treatment Surgery	-1.53	0.257	35.322	1	0.000	0.217	0.131	0.359
Attorney Retention	-0.206	0.268	0.588	1	0.443	0.814	0.481	1.377
Job Demand: Light to Medium	0.122	0.391	0.098	1	0.754	1.13	0.526	2.43
Job Demand: Medium to Heavy	0.278	0.4	0.482	1	0.487	1.321	0.602	2.895
Job Demand: Heavy to Very Heavy	0.331	0.449	0.544	1	0.461	1.392	0.578	3.353
Mood Disorder	0.149	1.118	0.018	1	0.894	1.161	0.13	10.382
Major Depressive Disorder	-0.371	1.099	0.114	1	0.736	0.69	0.08	5.952
Anxiety Disorder	-0.221	0.315	0.495	1	0.482	0.801	0.432	1.485
Panic Disorder	-0.144	0.476	0.092	1	0.762	0.866	0.341	2.199
Opioid Dependency	0.338	0.305	1.229	1	0.268	1.402	0.771	2.548
Any Cluster B Personality Disorder	0.354	0.324	1.199	1	0.274	1.425	0.756	2.688
Any Cluster C Personality Disorder	-0.397	0.317	1.572	1	0.210	0.672	0.361	1.251

Table A51. Overall Simultaneous Multinomial Logistic Regression Model:
Risk Factors for Upper Extremity, Cervical and Lower Extremity Injuries Compared to Pure Lumbar Cohort

Cervical Injury **Model Fit X^2 = 202.488; p < .001** **Nagelkerke R^2 = .334**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Intercept	-2.353	2.473	.905	1	.341			
Age	.036	.020	3.063	1	.080	1.036	.996	1.079
Length of Disability	.000	.006	.000	1	.988	1.000	.988	1.011
Beck Depression Inventory	.017	.019	.804	1	.370	1.017	.980	1.055
Million Visual Analog Scale	-.014	.013	1.292	1	.256	.986	.962	1.010
Pain Intensity Analog	.208	.122	2.903	1	.088	1.231	.969	1.563
SF-36 Physical Component Summary	.043	.027	2.476	1	.116	1.044	.990	1.101
Pain Disability Questionnaire Total	-.007	.012	.370	1	.543	.993	.970	1.016
Gender Female	.777	.414	3.518	1	.061	2.176	.966	4.902
Race Black	-.205	.492	.174	1	.677	.815	.310	2.137
Race Hispanic	-.337	.522	.417	1	.518	.714	.256	1.986
Race Other / Unknown	.285	.481	.352	1	.553	1.330	.519	3.412
No Pre Treatment Surgery	-.398	.384	1.073	1	.300	.672	.316	1.426
Attorney Retention	-.081	.396	.042	1	.838	.922	.424	2.005
Job Demand: Light to Medium	-.215	.621	.120	1	.729	.807	.239	2.724
Job Demand: Medium to Heavy	-.402	.625	.413	1	.520	.669	.197	2.277
Job Demand: Heavy to Very Heavy	-.310	.690	.202	1	.653	.733	.190	2.835
Mood Disorder	-1.290	1.245	1.073	1	.300	.275	.024	3.161
Major Depressive Disorder	.870	1.220	.508	1	.476	2.386	.218	26.092
Anxiety Disorder	.314	.492	.408	1	.523	1.369	.522	3.587
Panic Disorder	-1.150	.669	2.950	1	.086	.317	.085	1.176
Opioid Dependency	-.583	.397	2.154	1	.142	.558	.257	1.216
Any Cluster B Personality Disorder	.286	.447	.410	1	.522	1.331	.555	3.193
Any Cluster C Personality Disorder	-.368	.448	.673	1	.412	.692	.288	1.666

Table A52. Overall Simultaneous Multinomial Logistic Regression Model:
Risk Factors for Upper Extremity, Cervical and Lower Extremity Injuries Compared to Pure Lumbar Cohort

Lower Extremity Injury **Model Fit X2 = 202.488; p < .001** **Nagelkerke R2 = .334**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Intercept	-3.404	2.055	2.743	1	0.098			
Age	0.025	0.016	2.512	1	0.113	1.025	0.994	1.057
Length of Disability	-0.012	0.005	5.274	1	0.022	0.988	0.979	0.998
Beck Depression Inventory	-0.014	0.017	0.654	1	0.419	0.986	0.954	1.02
Million Visual Analog Scale	-0.007	0.011	0.386	1	0.535	0.993	0.973	1.014
Pain Intensity Analog	0.083	0.098	0.719	1	0.397	1.086	0.897	1.316
SF-36 Physical Component Summary	0.012	0.025	0.23	1	0.631	1.012	0.964	1.063
Pain Disability Questionnaire Total	-0.004	0.01	0.178	1	0.673	0.996	0.977	1.015
Gender Female	0.28	0.351	0.635	1	0.426	1.323	0.665	2.633
Race Black	0.15	0.425	0.124	1	0.725	1.162	0.505	2.673
Race Hispanic	0.539	0.473	1.303	1	0.254	1.715	0.679	4.33
Race Other / Unknown	0.376	0.362	1.077	1	0.299	1.456	0.716	2.963
No Pre Treatment Surgery	-1.653	0.312	27.998	1	0.000	0.191	0.104	0.353
Attorney Retention	-0.076	0.326	0.055	1	0.815	0.926	0.489	1.755
Job Demand: Light to Medium	0.38	0.478	0.631	1	0.427	1.462	0.573	3.732
Job Demand: Medium to Heavy	0.612	0.489	1.567	1	0.211	1.844	0.707	4.808
Job Demand: Heavy to Very Heavy	0.426	0.522	0.664	1	0.415	1.53	0.55	4.258
Mood Disorder	15.768	0.333	2.881	1	0.500	0.996	0.977	1.015
Major Depressive Disorder	-15.761	0.426	0.186	1	0.254	1.023	0.655	1.155
Anxiety Disorder	0.116	0.404	0.082	1	0.775	1.123	0.508	2.48
Panic Disorder	-0.413	0.622	0.441	1	0.507	0.662	0.195	2.24
Opioid Dependency	0.31	0.357	0.753	1	0.385	1.364	0.677	2.748
Any Cluster B Personality Disorder	0.171	0.395	0.186	1	0.666	1.186	0.547	2.572
Any Cluster C Personality Disorder	0.311	0.446	0.486	1	0.486	1.364	0.57	3.268

Table A53. Combined Version - Overall Simultaneous Multinomial Logistic Regression Model:
Risk Factors for Pure Upper Extremity, Pure Cervical and Pure Lower Extremity Injuries Compared to Pure Lumbar Cohort

Model Fit X^2 = 202.488; p < .001 **Nagelkerke R^2 = .334**	**Pure Upper Extremity**	**Pure Cervical**	**Pure Lower Extremity**
Age			
Beta	0.01	0.036	0.025
SD	0.013	0.020	0.016
Wald X2	0.583	3.063	2.512
p-value	0.445	0.080	0.113
OR [95% CI]	1.01 [0.985, 1.035]	1.036 [0.996, 1.079]	1.025 [0.994, 1.057]
Gender Female			
Beta	1.257	0.777	0.280
SD	0.284	0.414	0.351
Wald X2	19.535	3.518	0.635
p-value	0.000	0.061	0.426
OR [95% CI]	3.515 [2.013, 6.137]	2.176 [0.966, 4.902]	1.323 [0.665, 2.633]

Table A53. (continued)

	Pure Upper Extremity	Pure Cervical	Pure Lower Extremity
Race Black			
Beta	-0.587	-0.205	0.150
SD	0.348	0.492	0.425
Wald X2	2.835	0.174	0.124
p-value	0.092	0.677	0.725
OR [95% CI]	0.556 [0.281, 1.101]	0.815 [0.310, 2.137]	1.162 [0.505, 2.673]
Race Hispanic			
Beta	-0.211	-0.337	0.539
SD	0.357	0.522	0.473
Wald X2	0.349	0.417	1.303
p-value	0.555	0.518	0.254
OR [95% CI]	0.81 [0.402, 1.63]	0.714 [0.256, 1.986]	1.715 [0.679, 4.33]
Race Other / Unknown			
Beta	0.032	0.285	0.376
SD	0.310	0.481	0.362
Wald X2	0.011	0.352	1.077
p-value	0.918	0.553	0.299
OR [95% CI]	1.033 [0.562, 1.897]	1.330 [0.519, 3.412]	1.456 [0.716, 2.963]
Length of Disability			
Beta	-0.011	0.000	-0.012
SD	0.005	0.006	0.005
Wald X2	5.976	0.000	5.274
p-value	0.014	0.988	0.022
OR [95% CI]	0.989 [0.98, 0.998]	1.000 [0.988, 1.011]	0.988 [0.979, 0.998]

Table A53. (continued)

	Pure Upper Extremity	Pure Cervical	Pure Lower Extremity
Beck Depression Inventory			
Beta	0.000	0.017	-0.014
SD	0.013	0.019	0.017
Wald X2	0.000	0.804	0.654
p-value	0.990	0.370	0.419
OR [95% CI]	1.00 [0.974, 1.026]	1.017 [0.980, 1.055]	0.986 [0.954, 1.02]
Million Visual Analog Scale			
Beta	-0.047	-0.014	-0.007
SD	0.008	0.013	0.011
Wald X2	32.096	1.292	0.386
p-value	0.000	0.256	0.535
OR [95% CI]	0.954 [0.939, 0.97]	0.986 [0.962, 1.010]	0.993 [0.973, 1.014]
Pain Disability Questionnaire Total			
Beta	0.010	-0.007	-0.004
SD	0.008	0.012	0.010
Wald X2	1.514	0.370	0.178
p-value	0.219	0.543	0.673
OR [95% CI]	1.01 [0.994,1.025]	0.993 [0.970, 1.016]	0.996 [0.977, 1.015]
SF-36 Physical Component Summary			
Beta	0.059	0.043	0.012
SD	0.020	0.027	0.025
Wald X2	8.730	2.476	0.230
p-value	0.003	0.116	0.631
OR [95% CI]	1.061 [1.02,1.103]	1.044 [0.990, 1.101]	1.012 [0.964, 1.063]

Table A53. (continued)

	Pure Upper Extremity	Pure Cervical	Pure Lower Extremity
Pain Intensity Analog			
Beta	0.218	0.208	0.083
SD	0.079	0.122	0.098
Wald X2	7.650	2.903	0.719
p-value	0.006	0.088	0.397
OR [95% CI]	1.244 [1.066, 1.452]	1.231 [0.969, 1.563]	1.086 [0.897, 1.316]
No Pre-Treatment Surgery			
Beta	-1.530	-0.398	-1.653
SD	0.257	0.384	0.312
Wald X2	35.322	1.073	27.998
p-value	0.000	0.300	0.000
OR [95% CI]	0.217 [0.131, 0.359]	0.672 [0.316, 1.426]	0.191 [0.104, 0.353]
Attorney Retention			
Beta	-0.206	-0.081	-0.076
SD	0.268	0.396	0.326
Wald X2	0.588	0.042	0.055
p-value	0.443	0.838	0.815
OR [95% CI]	0.814 [0.481, 1.377]	0.922 [0.424, 2.005]	0.926 [0.489, 1.755]

Table A53. (continued)

	Pure Upper Extremity	Pure Cervical	Pure Lower Extremity
Job Demand: Light to Medium			
Beta	0.122	-0.215	0.380
SD	0.391	0.621	0.478
Wald X2	0.098	0.120	0.631
p-value	0.754	0.729	0.427
OR [95% CI]	1.13 [0.526, 2.43]	0.807 [0.239, 2.724}	1.462 [0.573, 3.732]
Job Demand: Medium to Heavy			
Beta	0.278	-0.402	0.612
SD	0.400	0.625	0.489
Wald X2	0.482	0.413	1.567
p-value	0.487	0.520	0.211
OR [95% CI]	1.321 [0.602, 2.895]	0.669 [0.197, 2.277]	1.844 [0.707, 4.808]
Job Demand: Heavy to Very Heavy			
Beta	0.331	-0.310	0.426
SD	0.449	0.690	0.522
Wald X2	0.544	0.202	0.664
p-value	0.461	0.653	0.415
OR [95% CI]	1.392 [0.578, 3.353]	0.733 [0.190, 2.835]	1.53 [0.55, 4.258]

Table A53. (continued)

	Pure Upper Extremity	Pure Cervical	Pure Lower Extremity
Mood Disorder			
Beta	0.149	-1.290	15.768
SD	1.118	1.245	0.333
Wald X2	0.018	1.073	2.881
p-value	0.894	0.300	0.500
OR [95% CI]	1.161 [0.13, 10.382]	0.275 [0.024, 3.161]	0.996 [0.977,1.015]
Major Depressive Disorder			
Beta	-0.371	0.870	-15.761
SD	1.099	1.220	0.426
Wald X2	0.114	0.508	0.186
p-value	0.736	0.476	0.254
OR [95% CI]	0.69 [0.08, 5.952]	2.386 [0.218, 26.092]	1.023 [0.655, 1.155]
Anxiety Disorder			
Beta	-0.221	0.314	0.116
SD	0.315	0.492	0.404
Wald X2	0.495	0.408	0.082
p-value	0.482	0.523	0.775
OR [95% CI]	0.801 [0.432, 1.485]	1.369 [0.522, 3.587]	1.123 [0.508, 2.48]
Panic Disorder			
Beta	-0.144	-1.150	-0.413
SD	0.476	0.669	0.622
Wald X2	0.092	2.950	0.441
p-value	0.762	0.086	0.507
OR [95% CI]	0.866 [0.341, 2.199]	0.317 [0.085, 1.176]	0.662 [0.195, 2.24]

Table A53. (continued)

	Pure Upper Extremity	Pure Cervical	Pure Lower Extremity
Opioid Dependency			
Beta	0.338	-0.583	0.310
SD	0.305	0.397	0.357
Wald X2	1.229	2.154	0.753
p-value	0.268	0.142	0.385
OR [95% CI]	1.402 [0.771, 2.548]	0.558 [0.257, 1.216]	1.364 [0.677, 2.748]
Any Cluster B Personality Disorder			
Beta	0.354	0.286	0.171
SD	0.324	0.447	0.395
Wald X2	1.199	0.410	0.186
p-value	0.274	0.522	0.666
OR [95% CI]	1.425 [0.756, 2.688]	1.331 [0.555, 3.193]	1.186 [0.547, 2.572]
Any Cluster C Personality Disorder			
Beta	-0.397	-0.368	0.311
SD	0.317	0.448	0.446
Wald X2	1.572	0.673	0.486
p-value	0.210	0.412	0.486
OR [95% CI]	0.672 [0.361, 1.251]	0.692 [0.288, 1.666]	1.364 [0.57, 3.268]
Intercept			
Beta	-0.099	-2.353	-3.404
SD	1.647	2.473	2.055
Wald X2	0.004	0.905	2.743
p-value	0.952	0.341	0.098
OR [95% CI]			

Table A54. Overall Simultaneous Multinomial Logistic Regression Model:
One-Year Socioeconomic Outcomes for Upper Extremity, Cervical and Lower Extremity Injuries Compared to Pure Lumbar Cohort

Upper Extremity **Model Fit X^2 = NS** **Nagelkerke R^2 = .010**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Intercept	-1.056	.343	9.498	1	.002			
Work Return – One Year	.078	.231	.113	1	.737	1.081	.687	1.701
Work Retention – One Year	.102	.203	.255	1	.614	1.108	.744	1.649
Health Utilization	.466	.173	7.263	1	.007	1.594	1.136	2.237
Mean Visits to New Provider	.014	.011	1.535	1	.215	1.014	.992	1.037
Surgery to Original Site	-.201	.311	.417	1	.518	.818	.445	1.505
Case Settlement	.254	.233	1.190	1	.275	1.289	.817	2.033

Table A55. Overall Simultaneous Multinomial Logistic Regression Model:
One-Year Socioeconomic Outcomes for Upper Extremity, Cervical and Lower Extremity Injuries Compared to Pure Lumbar Cohort

Cervical Injury **Model Fit X^2 = NS** **Nagelkerke R^2 = .010**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Intercept	-2.651	.680	15.201	1	.000			
Work Return – One Year	.334	.440	.577	1	.448	1.397	.590	3.309
Work Retention – One Year	-.140	.394	.126	1	.723	.869	.401	1.883
Health Utilization	-.076	.284	.071	1	.789	.927	.531	1.617
Mean Visits to New Provider	.008	.019	.197	1	.657	1.009	.971	1.047
Surgery to Original Site	.390	.638	.374	1	.541	1.477	.423	5.151
Case Settlement	-.195	.484	.162	1	.687	.823	.319	2.125

Table A56. Overall Simultaneous Multinomial Logistic Regression Model:
One-Year Socioeconomic Outcomes for Upper Extremity, Cervical and Lower Extremity Injuries Compared to Pure Lumbar Cohort

Lower Extremity **Model Fit X^2 = NS** **Nagelkerke R^2 = .010**	**Beta**	**SE**	**Wald**	**df**	**p-value**	**Odds Ratio**	**95% CI Lower**	**95% CI Upper**
Intercept	-2.177	.598	13.260	1	.000			
Work Return – One Year	.619	.481	1.654	1	.198	1.857	.723	4.767
Work Retention – One Year	-.438	.442	.980	1	.322	.646	.271	1.535
Health Utilization	.686	.333	4.237	1	.040	1.985	1.033	3.814
Mean Visits to New Provider	.009	.022	.148	1	.700	1.009	.966	1.053
Surgery to Original Site	-.557	.535	1.085	1	.298	.573	.201	1.634
Case Settlement	-.169	.482	.123	1	.726	.845	.328	2.173

Table A57. Combined Version - Overall Simultaneous Multinomial Logistic Regression Model:
One-Year Socioeconomic Outcomes for Upper Extremity, Cervical and Lower Extremity Injuries Compared to Pure Lumbar Cohort

Model Fit X^2 = NS **Nagelkerke R^2 = .010**	**Pure Upper Extremity**	**Pure Cervical**	**Pure Lower Extremity**
Intercept			
Beta	-1.056	-2.651	-2.177
SD	0.343	0.680	0.598
Wald X2	9.498	15.201	13.260
p-value	0.002	0.000	0.000
OR [95% CI]			
Work Return			
Beta	0.078	0.334	0.619
SD	0.231	0.440	0.481
Wald X2	0.113	0.577	1.654
p-value	0.737	0.448	0.198
OR [95% CI]	1.081 [0.687,1.701]	1.397 [0.590,3.309]	1.857 [0.723, 4.767]
Work Retention			
Beta	0.102	-0.140	-0.438
SD	0.203	0.394	0.442
Wald X2	0.255	0.126	0.980
p-value	0.614	0.723	0.322
OR [95% CI]	1.108 [0.744, 1.649]	0.869 [0.401,1.883]	0.646 [0.271, 1.535]

Table A57. (Continued)

	Pure Upper Extremity	Pure Cervical	Pure Lower Extremity
Health Utilization			
Beta	0.466	-0.076	0.686
SD	0.173	0.284	0.333
Wald X2	7.263	0.071	4.237
p-value	0.007	0.789	0.040
OR [95% CI]	1.594 [1.136, 2.237]	0.927 [0.531, 1.617]	1.985 [1.033, 3.814]
Mean Visits to New Provider			
Beta	0.014	0.008	0.009
SD	0.011	0.019	0.022
Wald X2	1.535	0.197	0.148
p-value	0.215	0.657	0.700
OR [95% CI]	1.014 [0.992, 1.037]	1.009 [0.971, 1.047]	1.009 [0.966, 1.053]
Surgery to Original Site			
Beta	-0.201	0.390	-0.557
SD	0.311	0.638	0.535
Wald X2	0.417	0.374	1.085
p-value	0.518	0.541	0.298
OR [95% CI]	0.818 [0.445, 1.505]	1.477 [0.423, 5.151]	0.573 [0.201, 1.634]
Case Settlement			
Beta	0.254	-0.195	-0.169
SD	0.233	0.484	0.482
Wald X2	1.190	0.162	0.123
p-value	0.275	0.687	0.726
OR [95% CI]	1.289 [0.817, 2.033]	0.823 [0.319, 2.125]	0.845 [0.328, 2.173]

Table A58. Demographic Characteristics

Demographic Variables	Upper Extremity n = 811	Cervical Spine n = 523	Lower Extremity n = 322	Multiple Site Including Lumbar n = 993	Multiple Site Excluding Lumbar n = 597	Pure Lumbar Spine n = 1673
Gender (% Male)	36.3% *p* < .001 X^2 = 144.808 OR= 2.9 [2.4, 3.4]	48.2% *p* < .001 X^2 = 46.007 OR= 1.9 [1.6, 2.4]	56.5%	51.5% *p* < .001 X^2 = 119.417	42.9% *p* < .001 X^2 = 119.417	66.5%
Age Mean yr/(SD)	46.4 (9.9)	46.2 (9.6) *p* = .002 *t* = 3.137 Cohen's *d* = 0.15	47.0 (10.2) *p* = .027** *t* = 2.210 Cohen's *d* = 0.14	46.5 (10.2) *p* < .001 F = 18.930	46.3 (9.6) *p* < .001 F = 18.930	44.2 (9.8)
Ethnicity (%)						
African Am	24.7%	19.7%	21.4%	20.9%	21.3%	15.6%
Caucasian	42.9%	56.2%	41.6%	50.3%	48.9%	54.1%
Hispanic	17.5%	14.0%	18.3%	17.1%	15.7%	19.4%
Asian	1.6%	1.1%	0.6%	0.9%	1.2%	1.3%
Other	13.3%	9.0%	18.0%	10.8%	12.9%	9.7%
	p = .047** X^2 = 9.656	*p* = .023** X^2 = 11.361	*p* = .037** X^2 = 10.204	*p* = .002 X^2 = 24.979	*p* = .002 X^2 = 24.979	

** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A59. Injury Specific Variables (Controlling for Demographic Variables)

Injury-Specific Variables	**Upper Extremity** n = 811	**Cervical Spine** n = 523	**Lower Extremity** n = 322	**Multiple Site Including Lumbar** n = 993	**Multiple Site Excluding Lumbar** n = 597	**Pure Lumbar Spine** n = 1673
Completion Rate (%)	77.3% *p* = .024** Wald X^2 = 5.072 OR= 1.3 [1.0, 1.5]	80.7%	71.1%	76.3% *p* = .025** Wald X^2 = 5.046 OR= 1.3 [1.0, 1.5]	79.1%	80.6%
Temporary-Total Disability Months/(SD)	14.0 (15.0) *p* = .006** Wald X^2 = 7.660	17.4 (20.3)	15.0 (19.0)	15.2 (19.3)	15.7 (17.5)	16.4 (20.8)
Length of Disability Months/(SD)	18.4 (24.8) *p* = .009** Wald X^2 = 6.742	20.2 (23.3)	17.9 (21.5)	16.8 (27.5) *p* = .006** Wald X^2 = 7.452	18.9 (21.2)	19.8 (26.8)
Pretreatment Surgeries (%)	58.2% *p* < .001 Wald X^2 = 158.32 OR= 3.3 [2.8, 4.0]	41.4% *p* < .001 Wald X^2 = 12.262 OR= 1.4 [1.2, 1.8]	66.0% *p* < .001 Wald X^2 = 115.05 OR= 4.1 [3.2, 5.3]	31.2%	52.5% *p* < .001 Wald X^2 = 78.874 OR= 2.4 [2.0, 2.9]	33.2%
Attorney Retained (%)	17.8%	21.1%	20.4%	24.1% *p* = .004** Wald X^2 = 8.208 OR= 1.4 [1.1, 1.6]	20.0%	19.3%
Case Settlement Pre-treatment (%)	28.3%	27.3%	29.8%	27.7%	28.2%	27.6%
Compensable Body Parts Mean (SD)	1.8 (0.9) *p* < .001 Wald X^2 = 93.858 OR= 1.7[1.54, 1.92]	1.9 (0.9) *p* < .001 Wald X^2 = 207.93 OR= 2.6 [2.3, 2.9]	1.5 (0.9)	2.6 (0.9)	2.5 (0.7)	1.0 (0.0)

Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A60. Pre-Treatment Psychosocial Variables (Controlling for Demographic Variables)

Psychosocial Variables	**Upper Extremity** n = 789	**Cervical Spine** n = 509	**Lower Extremity** n = 322	**Multiple Site Including Lumbar** n = 960	**Multiple Site Excluding Lumbar** n = 578	**Pure Lumbar Spine** n = 1539
BDI X/(SD)	17.3 (11.4) *p* < .001 Wald X^2 = 16.216	18.3 (10.6)	16.5 (11.4) *p* < .001 Wald X^2 = 12.703	19.4 (11.3) *p* = .047** Wald X^2 = 3.931	17.9 (11.0)	17.5 (10.6)
Pain Intensity X/(SD)	6.6 (1.9) *p* < .001 Wald X^2 = 15.025	6.8 (1.9)	6.5 (2.0) *p* =.003** Wald X^2 = 8.734	6.9 (1.8)	6.7 (2.0)	6.7 (1.9)
MVAS X/(SD)	82.7 (25.4) *p* < .001 Wald X^2 = 226.46	91.3 (24.8) *p* < .001 Wald X^2 = 33.7	93.7 (24.7) *p* < .001 Wald X^2 = 15.450	98.9 (22.0) *p* = .040** Wald X^2 = 4.228	86.6 (26.7) *p* < .001 Wald X^2 = 63.6	96.2 (23.9)
PDQ X/(SD)	92.7 (26.1) *p* < .001 Wald X^2 = 38.508	101.2 (22.7)	99.5 (24.6) *p* = .038** Wald X^2 = 4.3	103.7 (24.3)	96.7 (25.6) *p* < .001 Wald X^2 = 13.1	103.7 (23.2)
Functional	55.2 (16.1) *p* < .001 Wald X^2 = 39.71	60.6 (13.5)	59.6 (15.4)	60.9 (16.2)	57.5 (15.8) *p* = .025** Wald X^2 = 5.0	62.5 (14.0)
Psychosocial	37.5 (13.0) *p* < .001 Wald X^2 = 23.33	40.6 (11.2)	39.9 (12.3)	42.7 (13.2)	39.2 (12.1)	41.4 (11.7)
SF-36 X/(SD) Mental Health	38.5 (9.9)	39.0 (9.6)	39.3 (11.0)	38.4 (10.1)	38.6 (9.6)	39.1 (9.7)
Physical Health	32.1 (12.7) *p* < .001 Wald X^2 = 53.677	31.2 (16.2) *p* = .004** Wald X^2 = 8.421	29.2 (5.7)	29.0 (5.5)	31.6 (14.9) *p* = .003** Wald X^2 = 8.63	29.2 (5.9)

Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A61. Post-Injury Axis I DSM-IV Diagnoses (Controlling for Demographic Variables)

Axis I Variables	**Upper Extremity** n = 745	**Cervical Spine** n = 457	**Lower Extremity** n = 294	**Multiple Site Including Lumbar** n = 882	**Multiple Site Excluding Lumbar** n = 532	**Pure Lumbar Spine** n = 1412
Mood Disorder (%)	57.2%	60.2% p = .003** Wald X^2 = 8.579 OR: 1.4 [1.1, 1.7]	54.1%	60.9% p < .001 Wald X^2 = 19.687 OR: 1.5 [1.2, 1.8]	60.2% p = .004** Wald X^2 = 8.488 OR: 1.4 [1.1, 1.7]	49.5%
Major Depressive Disorder (%)	56.1%	59.1% p = .008** Wald X^2 = 7.093 OR: 1.3 [1.1, 1.7]	52.7%	60.4% p < .001 Wald X^2 = 19.622 OR: 1.5 [1.2, 1.8]	59.2% p = .006** Wald X^2 = 7.432 OR: 1.3 [1.1, 1.6]	49.1%
Substance Use Disorder (%)	13.4% p < .001 Wald X^2 = 18.215 OR= 1.7 [1.3, 2.2]	18.2%	17.0% p = .040** Wald X^2 = 4.217 OR= 1.4 [1.0, 2.0]	20.2%	16.4% p = .011** Wald X^2 = 6.474 OR= 1.4 [1.1, 1.8]	22.9%
Alcohol Dependency	1.2%	1.5%	1.7%	1.4%	1.1%	1.6%
Opioid Dependency	11.3% p < .001 Wald X^2 = 20.963 OR= 1.9 [1.4, 2.4]	17.3%	15.3% p = .030** Wald X^2 = 4.706 OR= 1.5 [1.0, 2.1]	18.4%	15.0% p = .027** Wald X^2 = 4.899 OR= 1.4 [1.0, 1.8]	20.3%
Anxiety Disorder (%)	18.0%	17.5% p = .032** Wald X^2 = 4.584 OR: 1.4 [1.1, 1.8]	18.0%	17.2% p = .002 Wald X^2 = 9.345 OR= 1.2 [1.5, 1.9]	18.2% p = .007** Wald X^2 = 7.220 OR= 1.5 [1.1, 2.0]	11.5%
Panic Disorder (%)	6.2%	6.8% p = .007** Wald X^2 = 7.331 OR: 1.9 [1.2, 3.0]	4.4%	5.2%	6.4% p = .032** Wald X^2 = 5.589 OR= 1.7 [1.0, 2.7]	3.1%

Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A62. Post-Injury Axis II DSM-IV Diagnoses (Controlling for Demographics)

Axis II Variables	**Upper Extremity** n = 699	**Cervical Spine** n = 444	**Lower Extremity** n = 272	**Multiple Site Including Lumbar** n = 838	**Multiple Site Excluding Lumbar** n = 506	**Pure Lumbar Spine** n = 1364
Any Cluster A Diagnosis	21.6%	25.0%	16.2%	23.0%	23.9%	23.7%
Any Cluster B Diagnosis	31.8%	32.7% *p* = .047** Wald X^2 = 3.947 OR: 1.3 [1.0, 1.6]	31.6%	38.7%	32.4% *p* = .023** Wald X^2 = 5.178 OR= 1.3 [1.0, 1.6]	36.7%
Any Cluster C Diagnosis	25.5%	27.0%	18.0% *p* = .031** Wald X^2 = 4.656 OR: 1.4 [1.0, 2.0]	25.2%	25.9%	25.0%

Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A63. MMPI Clusters (Controlling for Demographics)

MMPI Clusters	**Upper Extremity** n = 467	**Cervical Spine** n = 310	**Lower Extremity** n = 162	**Multiple Site Including Lumbar** n = 574	**Multiple Site Excluding Lumbar** n = 334	**Pure Lumbar Spine** n = 1000
MMPI Normal Profile 0 Scale Elevations	8.1%	7.7%	13.0%	5.9%	8.4%	7.9%
MMPI Disability Profile 4 or more scale elevated	45.0% *p* = .009** Wald X^2 = 6.781 OR= 1.4 [1.1, 1.7]	48.4%	45.7%	57.8% *p* = .002 Wald X^2 = 9.714 OR= 1.4 [1.1, 1.7]	49.7%	49.2%
MMPI Conversion V Scale 1 & 3 elevated	9.9%	11.3%	9.3%	9.6%	9.6%	11.9%
MMPI Neurotic Triad Scale 1,2,& 3 elevated	9.0%	9.4%	8.6%	7.8%	7.8%	7.1%

Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A64. Work Related Variables (Controlling for Demographics)

Work Related Variables	**Upper Extremity** n = 793	**Cervical Spine** n = 523	**Lower Extremity** n = 307	**Multiple Site Including Lumbar** n = 993	**Multiple Site Excluding Lumbar** n = 506	**Pure Lumbar Spine** n = 1364
Work Status at Admission	13.8%	13.6%	14.3%	12.1 %	13.9%	13.1%
Original Job Available	50.1%	47.8%	52.9%	46.7%	48.3%	49.0%
Job Satisfaction (PRE) 1- Very Satisfied 2- Satisfied 3- Neither 4- Dissatisfied 5- Very Dissatisfied	57.0% 25.2% 10.4% 4.0% 3.4%	57.9% 22.1% 11.5% 3.4% 5.0%	66.0% 18.1% 10.1% 2.5% 3.4%	58.7% 22.8% 12.9% 3.1% 2.6%	60.7% 22.4% 9.4% 4.1% 3.3%	57.2% 25.6% 11.9% 2.8% 2.5%
Job Code (% Blue)	66.1%	67.2%	74.9%	69.4%	66.9%	76.6%
Job Demand 1- Sedentary /Light 2- Light/ Medium 3- Medium/Heavy 4- Heavy/Very	24.1% 30.6% 29.8% 15.5% *p* < .001 Wald X^2 = 14.84 OR for levels 3/4: 1.5 [1.2, 1.8]	15.5% 28.5% 33.2% 22.8%	15.0% 28.3% 31.3% 25.4% *p* = .019** Wald X^2 = 5.485 OR for levels 3/4: 1.4 [1.1, 1.8]	14.9% 27.0% 35.7% 22.4%	22.4% 28.1% 32.0% 17.6% *p* = .002 Wald X^2 = 9.941 OR for levels 3/4: 1.4 [1.1, 1.8]	8.5% 24.7% 39.8% 27.0%

Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

Table A65. One-Year Outcomes – Program Completers Only (Controlling for Demographics)

One Year Outcomes	**Upper Extremity** n = 556	**Cervical Spine** n = 401	**Lower Extremity** n = 207	**Multiple Site Including Lumbar** n = 667	**Multiple Site Excluding Lumbar** n = 424	**Pure Lumbar Spine** n = 1117
Return to Work	86.0%	86.5%	87.0%	88.5%	86.1%	88.0%
Work Retention	79.8%	78.5%	82.3%	82.1%	78.8%	81.0%
Treatment Seeking	16.8% *p* = .041** Wald X^2 = 4.187 OR = 1.3 [1.0, 1.7]	24.3%	16.0%	22.5%	23.1%	22.3%
Visits to New Provider	1.8 (5.8)	2.6 (6.7)	1.7 (5.8)	2.2 (6.1)	2.3 (6.4)	2.0 (5.6)
New Surgery To Original Site	3.0%	3.1%	3.5%	1.8%	3.5%	2.8%
Case Settlement 1 Year	97.7% *p* = .003** Wald X^2 = 8.562 OR = 2.3 [1.3, 4.2]	94.5%	96.1%	96.0%	94.8%	96.1%

Multivariate regression analyses utilized to control for Age, Gender and Ethnicity.
** Not Significant upon applying the Holm-Bonferroni adjustment for multiple comparisons.

APPENDIX B

SUPPLEMENTARY TABLES

Table B1. Upper Extremity Diagnoses

Specific Diagnoses for Upper Extremity Injuries	
Shoulder Diagnosis Fracture Glenohumeral Dislocation AC Joint Dislocation/Arthritis Glenohumeral Joint Arthritis Impingement Syndrome/Tendinitis Rotator Cuff Tear Brachial Plexus Injury Other Nerve Injury/Entrapment Postop Prior Non-Specific Amputation Other **Elbow Diagnosis** Fracture Dislocation Arthritis Lateral Epicondylitis/Tendinitis Medial Epicondylitis/Tendinitis Cubital Tunnel Syndrome Pos. Interosseous Nerve Intrapment Postop Prior Non-Specific Amputation Other **Wrist Diagnosis** Fracture Dislocation Arthritis de Quervain's (Tendinitis) Tendinitis CTS and other Nerve Compression Other Nerve Injury/Entrapment Postop Fusion/Arthroplasty Postop Prior Non-Specific Amputation Ligament Sprain / Other	**Hand Diagnosis** Fracture Dislocation Arthritis/DJD Trigger Joint Tendon Laceration/ Dysfunction Tendinitis Nerve Laceration/Entrapment Postop Prior Non-Specific Amputation Other **Other Upper Extremity Diagnosis** Long Bone Fracture RDS/Causalgia/CRPS Thoracic Outlet Syndrome Peripheral Vascular Disease Postop Non-Specific Pain Non-Specific

Table B2. Cervical Spine Diagnoses

Specific Diagnoses for Cervical Spine Injuries
Cervical Diagnosis Fracture Dislocation Degenerative Disc/ Facet Arthroplasty/ Stenosis Radiculopathy Postop Discectomy / Non-Arthroplasty Postop Arthroplasty (Fusion/ TDR) Non-Specific Neck Pain

Table B3. Lower Extremity Diagnoses

Specific Diagnoses for Lower Extremity Injuries	
Hip Diagnosis Fracture w/ w/out Pseudoarthritis Dislocation Degenerative Joint Disorder Piriformis Tendinitis / Bursitis Femoral Neuritis Other Nerve Injury/ Entrapment Postop Fusion / Arthroplasty Postop Prior Non-Specific Amputation Non-Specific Hip Pain **Knee Diagnosis** Fracture w/ w/out Pseudoarthritis Dislocation Degenerative Joint Disorder Patellofemoral Dys./Chonromalacia Ligament Injury (Sprain) Meniscal Injury/Tear Tendinitis/ Bursitis (other) Nerve Injury/ Entrapment Postop Fusion / Arthroplasty Postop Prior Non-Specific Amputation Non-Specific Knee Pain	**Ankle Diagnosis** Fracture w/ w/out Pseudoarthritis Dislocation Degenerative Joint Disorder Ligament Injury (Sprain) Tarsal Tunnel/ Nerve Compression Tendinitis Nerve Injury / Entrapment Postop Fusion / Arthroplasty Postop Prior Non-Specific Amputation Non-Specific Ankle Pain **Foot Diagnosis** Fracture w/ w/out Pseudoarthritis Dislocation Degenerative Joint Disorder Plantar Fasciitis Tendinitis / Tenosynovitis Nerve Injury / Entrapment Crush Injury Postop Prior Non-Specific Amputation Non-Specific Foot Pain **Other Lower Extremity Diagnosis** Long Bone Fracture RSD/Causalgia/ CRPS Peripheral Vascular Disease

Table B4. Lumbar Spine Diagnoses

Specific Diagnoses for Lumbar Spine Injuries
Lumbar Diagnosis
Fracture
Dislocation
Degenerative Disc/ Facet Arthroplasty/ Stenosis
Radiculopathy
Spondylolysis/ Spondylolisthesis
Postop Discectomy / Non-Arthroplasty
Postop Arthroplasty (Fusion/ TDR)
Non-Specific Lumbar Pain

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BIOGRAPHICAL INFORMATION

Krista Howard was born in Salina, Kansas and has lived in the Dallas area since 1985. She graduated from Euless Trinity High School in 1992. Krista received her Bachelor of Arts degree in Experimental Psychology from The University of Texas at Arlington in 1997 and her Teaching Certification for Secondary Mathematics in 1998. After teaching for 7 years, Krista returned to graduate school at the University of Texas at Arlington. She received her Master of Science degree in Health Psychology in 2008. Upon graduating with her PhD in May 2010, Krista will be pursuing a position as an Assistant Professor of Occupational Health Psychology at Texas State University in San Marcos, Texas. Krista married Jeff Howard in 1995 and together they have two daughters, Kyla and Kadey.