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Impact of Pretreatment Self-Perceived Quality of Life on Chronic Pain Patients

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This is to certify that the doctoral dissertation by

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Walden University
2015

Abstract

Impact of Pretreatment Self-Perceived Quality of Life on Chronic Pain Patients

by

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Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy
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Abstract

Researchers and practitioners have developed new treatment options for chronic pain management based on biopsychosocial models of pain known as interdisciplinary pain management programs (IPMP), which involve interdisciplinary care that integrates physical treatment with emotional, environmental, behavioral, and cognitive interventions. Despite literature documenting the effectiveness of IPMPs, patients find it difficult to obtain authorization for these programs from third party insurance payers. The purpose of this quantitative causal comparative study was to explore whether a patient's perceived quality of life after injury but prior to treatment will affect his or her success in an IPMP. This study was based in the theoretical foundations of the biopsychosocial model of pain as well as positive psychology. Regression analysis and a test of mean differences were used to analyze the data to determine if there was a statistically significant difference in the perceived success in an IPMP program between patients who were part of a workers' compensation program (n = 77) and those who were not (n = 60). None of the null hypotheses could be rejected. Quality of Life Index (QOLI) scores were not predictive of success in an IPMP. None of the QOLI 16 subscales were predictive of success in an IPMP. Additionally, there was no significant difference between patients who were on workers' compensation and those who were not. This study contributes to the knowledge gap regarding appropriate screening tools for admittance into an IPMP. The results of this study can be used by practitioners who are trying to get patients approved for an IPMP and by third party insurance payer when determining which patients would most benefit from attending an IPMP.

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Dedication

This is dedicated to the love of my life, my road trip partner, my (sometimes) voice of reason, and my (all the time) best friend. Thank you.

Acknowledgments

I am not sure how to appropriately thank everyone I need to for their unending support. As I mentally make my list of people I need to acknowledge and thank I cannot help but realize how incredibly blessed I am to have such amazing friends, family, and mentors.

First and foremost, I would like to thank my dissertation committee; Dr. Robbins, Dr. Caramela-Miller, and Dr. Murray. Your honest feedback, your constructive criticism, and your praise when I finally got it right are the reasons I am where I am today. I appreciate the faith you had in me.

Thank you to my parents, without whom, I may never have dreamed so big. Thank you to my husband, who deserves more gratitude and appreciation than I could possibly show in a lifetime. Thank you to my son, who is, and always will be what I am most proud of in my life. Thank you to Dr. Miller for supervising, mentoring, and humoring me when needed. Thank you to Dr. Basrai for allowing me to conduct my research at your facility. Thank you to Dr. Yabes for being a Medical Director that I could look up to and learn from; you have instilled in me a love of PM&R.

I am sure that I have unintentionally missed someone to whom I owe a large debt of gratitude (and a bottle of wine). If you are reading this, and you are one of those unintentionally overlooked supporters, please hit me up for 2 bottles…One because you deserve it for all of your help and the second for my negligence in not giving you your proper credit and thanks in the first place!

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Chapter 1: Introduction to the Study

Introduction

Chronic pain is a growing problem in the United States. Chronic pain affects approximately 100 million people in the United States and costs an estimated $560 to $635 billion annually (Institute of Medicine, 2011). According to the Centers for Disease Control and Prevention (2010), nearly one in two adults report some form of chronic health condition, and one in four report some form of limitation to daily activities. The severity of chronic pain and its effect on U.S. citizens continues to climb, in part because of the lack of cost effective treatment methods, but also because of an aging population (Gatchel, McGeary, McGeary, & Lippe, 2014). However, the phenomenon of pain is no simple matter. Chronic pain is a complex “biopsychosocial” phenomenon consisting of biological, psychosocial, socioeconomic, and subjective factors (Gatchel et al., 2014, p. 119). Researchers and practitioners have developed new treatment options for chronic pain management based on biopsychosocial models of pain. These treatment options, known as interdisciplinary pain management programs (IPMP), involve interdisciplinary care that integrates physical treatment with emotional, environmental, behavioral, and cognitive interventions (Gatchel et al., 2014). IPMPs can provide medical interventions such as opioid medications and injections. In addition, IPMPs seek to educate patients about how their emotions, environment, and behaviors impact their chronic pain. IPMPs work with patients to help them change their perceptions and behaviors through cognitive behavioral therapy and psychoeducational lectures.

Despite literature documenting the effectiveness of IPMPs (Gatchel et al., 2014; McGeary et al., 2012; Rogerson, Gatchel, & Bierner, 2010), patients often find it difficult to obtain authorization for these programs from third party insurance payers (Gatchel et al., 2014) who often do not understand the long-term benefits of IPMPs, both in terms of cost and in terms of patients' results (Gatchel & Okifuji, 2006). Part of the reason for this problem is the lack of appropriate and consistently applied screening tools to determine which patients will benefit the most from this treatment (Gatchel & Okifuji, 2006). However, Wahl et al. (2009) evaluated different health-related quality of life issues in patients with chronic pain and found that patients experiencing chronic pain reported a variety of significant problems, including disability and poorer physical and mental health, as well as emotional disturbances, anxiety, depression, fatigue, and sleep disturbances. Psychological resilience, positive emotions, and perceived self-efficacy, all aspects of a patient's perceived quality of life, have been shown to play a part in a patient's experience of chronic pain and his or her tendency to catastrophize pain (Borsbo, Gerdle, & Peolsson, 2010; Ong, Reid, & Zautra, 2010). Patients who demonstrate an ability to cope with changes and stress show a degree of psychological resilience that can help them normalize the experience of pain thereby reducing their tendency to catastrophize their pain. Perceived self-efficacy can impact how patients views themselves, their ability to manage their pain, and their feelings of control over their lives.

Assessment tools for chronic pain management have not been adequately developed or adapted to reflect changes in approaches to chronic pain represented in biopsychosocial models. Consequently, more research is needed on patients' perceived quality of life and its effectiveness in selecting which patients would most benefit from IPMP intervention. This gap in the research is a problem because medical and psychological providers, as well as third party insurance payers, are missing predictive information that could allow patients access to timely and effective chronic pain management care. In this study, I sought to fill the gaps in the research by examining quality of life as a patient selection framework for IPMPs. The results of this study may provide information to enable third party insurance payers to make quicker and more cost-effective decisions regarding patients' admittance into an IPMP, which will allow patients to access more effective chronic pain management care and recover more quickly.

This chapter includes a background of the phenomenon, the research problem, as well as the purpose of the study, the research questions, and hypotheses. In addition, I will outline the theoretical framework; elaborate on the nature of the study; define variables for the study; and address assumptions, scope and delimitations, and limitations of the study. The chapter ends by stating the significance of the study and providing a summary, which includes a transition to Chapter 2.

Background

Historically, pain has been approached and understood in the literature through biomedical models that focus on the physiological aspects of pain and require biomedical interventions, such as opioid medication and surgery (Gatchel et al., 2014). Researchers are addressing pain as a complex phenomenon involving not only physiological factors but cultural, social, emotional, and psychological factors, a phenomenon better approached and assessed through biopsychosocial models of pain (Gatchel et al., 2014). IPMPs evolved as intervention options that include interdisciplinary approaches to chronic pain management in an attempt to address the cultural, social, emotional, and psychological components of chronic pain (Bruns, Mueller, & Warren, 2012). Researchers have found that IPMPs can be effective in managing chronic pain (Gatchel et al., 2014; McGeary et al., 2012; Rogerson et al., 2010). However, third party insurance payers are often reluctant to authorize these programs for patients; these payers see IPMPs as too costly up front and do not realize how costs may be saved in the long run (Gatchel et al., 2014). What is missing in the literature is predictive information for third party insurance payers to make informed decisions regarding authorization and, consequently, allow patients access to effective chronic pain management care. In this study, I sought to address the gaps in the literature concerning screening frameworks and tools used to determine which patients would benefit the most from IPMPs.

Problem Statement

Consistently applied screening tools do not exist to determine which patients suffering from chronic pain would most benefit from an IPMP. Consequently, third party insurance payers are often reluctant to authorize these programs for patients. While IPMPs offer not only the best clinical care for chronic pain sufferers but also the most cost-effective, long-term treatment option, third party insurance payers are hesitant to approve such programs because they are too costly upfront, without realizing that costs will be saved in the long run (Gatchel et al., 2014). Wahl et al. observed that chronic pain may influence an individual's physical, social, and mental well-being, and it is a stressor that exceeds routine coping capabilities, thereby reducing quality of life. In addition, significant numbers of patients continue to experience chronic pain despite traditional surgical and pharmacological interventions (Wahl et al., 2009). Although Wahl et al. found no direct, one-to-one relationship between chronic pain and global quality of life, Wahl et al. claimed that a complex relationship exists between chronic pain and patients' quality of life, a relationship that warrants further research.

If third party insurance payers had better selection criteria to help determine which patients would benefit the most from IPMPs, then payers would be more inclined to approve IPMPs for patients. This study was needed to add to the current research regarding patient selection and the prediction of patient success in an IPMP. Furthermore, little research exists in the field on patients' perceived quality of life after injury, but prior to treatment, and how that perception affects their success in an IPMP. The research problem for this study involved the absence of research regarding patients' perceived quality of life and the affect perceived quality of life may have on how effective IPMPs are for patients experiencing chronic pain. The findings of this study will provide the health field with predictive information that could help patients access the most effective chronic pain management care for their needs.

Purpose of the Study

The purpose of this quantitative causal comparative study was to explore and analyze whether a patient's perceived quality of life after injury but prior to treatment will affect his or her success in an IPMP. The independent variable (IV) was the patients' perceived quality of life after injury but prior to treatment, as measured by the Quality of Life Inventory (QOLI). The dependent variable (DV) was a patient's change in disability status, as measured from the Oswestry Disability Index. I used archival data from the years 2011-2013 for both the QOLI and the Oswestry Disability Index. These assessments were administered to participants both before and after completion of an IPMP; the difference between pre-IPMP scores and post-IPMP scores represented the change in their disability status. The effect of quality of life on this change in disability was assessed through linear regression analysis. The change in disability status was also assessed between workers' compensation patients and other patients through use of a *t*-test analysis.

Research Questions and Hypotheses

1. Does a patient's overall perceived quality of life after an injury affect his or her perceived success in an IPMP program, as measured by his or her self-reported change in disability?

$H_0$1**:** A patient's overall perceived quality of life before participation in an IPMP is not a statistically significant predictor of his or her change in disability status from before participation to after his or her participation in an IPMP.

H_a1**:** A patient's overall perceived quality of life before participation in an IPMP is a statistically significant predictor of his or her change in disability status from before participation to after his or her participation in an IPMP.

2. Which of the 16 scales of Quality of Life Index significantly and uniquely predict success in an IPMP program?

$H_{01}2$**:** There is no statistically significant relationship between health-related quality of life and success in an IPMP program.

$H_{a1}2$**:** There is a statistically significant relationship between health-related quality of life and success in an IPMP program.

$H_{02}2$: There is no statistically significant relationship between self-esteem related quality of life and success in an IPMP program.

$H_{a2}2$: There is a statistically significant relationship between self-esteem related quality of life and success in an IPMP program.

$H_{03}2$**:** There is no statistically significant relationship between goal and value related quality of life and success in an IPMP program.

$H_{a3}2$**:** There is a statistically significant relationship between goal and value related quality of life and success in an IPMP program.

$H_{04}2$**:** There is no statistically significant relationship between money related quality of life and success in an IPMP program.

$H_{a4}2$**:** There is a statistically significant relationship between money related quality of life and success in an IPMP program.

$H_{05}2$**:** There is no statistically significant relationship between work related quality of life and success in an IPMP program.

$H_{a5}2$**:** There is a statistically significant relationship between work related quality of life and success in an IPMP program.

$H_{06}2$**:** There is no statistically significant relationship between play related quality of life and success in an IPMP program.

$H_{a6}2$**:** There is a statistically significant relationship between play related quality of life and success in an IPMP program.

$H_{07}2$**:** There is no statistically significant relationship between learning related quality of life and success in an IPMP program.

$H_{a7}2$**:** There is a statistically significant relationship between learning related quality of life and success in an IPMP program.

$H_{08}2$**:** There is no statistically significant relationship between creativity related quality of life and success in an IPMP program.

$H_{a8}2$**:** There is a statistically significant relationship between creativity related quality of life and success in an IPMP program.

$H_{09}2$**:** There is no statistically significant relationship between quality of life related to helping and success in an IPMP program.

$H_{a9}2$**:** There is a statistically significant relationship between quality of life related to helping and success in an IPMP program.

$H_{010}2$**:** There is no statistically significant relationship between love related quality of life and success in an IPMP program.

$H_{a10}2$**:** There is a statistically significant relationship between love related quality of life and success in an IPMP program.

$H_{011}2$: There is no statistically significant relationship between friend related quality of life and success in an IPMP program.

$H_{a11}2$**:** There is a statistically significant relationship between friend related quality of life and success in an IPMP program.

H_{012}2: There is no statistically significant relationship between children-related quality of life and success in an IPMP program.

H_{a12}2: There is a statistically significant relationship between children-related quality of life and success in an IPMP program.

H_{013}2: There is no statistically significant relationship between related quality of life regarding relatives and success in an IPMP program.

H_{a13}2: There is a statistically significant relationship between related quality of life regarding relatives and success in an IPMP program.

H_{014}2: There is no statistically significant relationship between home related quality of life and success in an IPMP program.

H_{a14}2: There is a statistically significant relationship between home related quality of life and success in an IPMP program.

H_{015}2: There is no statistically significant relationship between neighborhood related quality of life and success in an IPMP program.

H_{a15}2: There is a statistically significant relationship between neighborhood related quality of life and success in an IPMP program.

H_{016}2: There is no statistically significant relationship between community related quality of life and success in an IPMP program.

H_{a16}2: There is a statistically significant relationship between community related quality of life and success in an IPMP program.

3. Is there a statistically significant difference in the perceived success in an IPMP program between patients who are part of a workers' compensation program and those who are not?

$H_0$3**:** There is no statistically significant difference in the change in perceived disability status before versus after participation in an IPMP in workers' compensation patients versus other patients.

H_a3: There is a statistically significant difference in the change in perceived disability status before versus after participation in an IPMP for workers' compensation patients versus other patients.

Theoretical Framework for the Study

In this study, I used the theories and perspectives of positive psychology and biopsychosocial models of pain. In biopsychosocial models of pain, researchers emphasize the multidimensional nature of pain experiences and the dynamic interaction among physiological, psychological, and social factors (Gatchel et al., 2014). Biopsychosocial approaches to pain are now accepted as the prevailing understanding and treatment approach to chronic pain disorders and conditions (Gatchel et al., 2014). Biopsychosocial models of pain have come to supplement biomedical models often seen as reductionist because they do not encompass psycho-emotional and contextual factors (Gatchel et al., 2014). Pain is a complex phenomenon involving biological, psychosocial, emotional, and cognitive elements that can be effectively managed through an integrated, interdisciplinary approach that addresses these various elements (Gatchel et al., 2014). The biopsychosocial model of pain provided a theoretical framework for this study because of the subjective nature of the research questions and hypotheses, which focused on patients' self-perceptions of their own disability and quality of life. These patient self-perceptions involved both personal and social factors relating to global health, life satisfaction, and fulfillment. Wahl et al. found that patients continue to experience chronic pain despite traditional surgical and pharmacological interventions and that a complex relationship exists between chronic pain and patients' quality of life.

The main tenet of positive psychology is that good mental and physical health is not just the absence of illness and stress but also the presence of flourishing and well-being; positive emotions influence quality of life, which includes factors of fulfillment and life satisfaction (Pulvers & Hood, 2013). Positive psychologists introduced a "science of positive subjective experience, positive individual traits, and positive institutes to improve quality of life and prevent the pathologies that arise when life is barren and meaningless" (Seligman & Csikszentmihalyi, 2000, p. 5). Seligman and Csikszentmihalyi (2000) believed that the psychological community had an obligation to not only heal people who had suffered emotional trauma but also to explore what made ordinary people happy and able to flourish. According to Seligman and Csikszentmihalyi, psychology is more than simply "repairing the worst things in life; it is also about building positive qualities" (p. 5). If the experience of chronic pain involves psychological and emotional factors, as well as physiological ones, then positive psychology and its tenet to build a better, more positive life can influence how people conceptualize, experience, and cope with chronic pain. The tenets associated with positive psychology, such as optimism, can act as a protective factor against pain

(Hanssen, Vancleef, Vlaeyen, & Peters, 2012). Optimism has been shown to be related to pain intensity (Hanssen et al., 2012). For the purposes of this research, the perspectives of positive psychology were appealing because of the potential protective factors against chronic pain that positive emotions and approaches can provide to patients. This is a theoretical foundation for a discussion and analysis of patients' self-perception of their own quality of life.

Nature of the Study

This study consisted of a quantitative, nonexperimental causal comparative design. The IV in this study was the perceived quality of life after the incident but prior to treatment, as measured by the QOLI. The DV was the patients' perceived change in disability; this was measured as the difference in Oswestry Disability Index scores from before participation in the IPMP program to after. The selection of participants was drawn from chronic pain patients who had participated in a functional restoration program at the Summit Pain Management Institute located in Northern California. The rationale for this selection was a matter of convenience; this was a sample to which I had access. When patients began the functional restoration program at the Summit Pain Management Institute, they were given the QOLI as well as the Oswestry Disability Index. Upon completion of the program, patients were again given the Oswestry Disability Index. This methodology is discussed more in depth in Chapter 3.

Definitions

Acute pain: Acute pain is defined as a sudden indicator of tissue damage, an adaptive alarm alerting individuals to address the cause of pain and to take actions to protect and prevent further tissue damage, as well as avoiding similar encounters in the future (Lumley et al., 2011). Acute pain has been typically treated and conceptualized biomedically (Lumley et al., 2011).

Chronic pain: Chronic pain is persistent pain lasting at least 3 months and as being more complicated than acute pain (Lumley et al., 2011). For example, psychological, emotional, and social factors, as well as neurobiological ones, can lead to chronic or persistent pain (Lumley et al., 2011). Because of the multidimensional nature of chronic pain, it is beginning to be addressed through biopsychosocial models of pain that allows for the consideration of social, emotional, psychological, and physiological factors in how individuals experience pain (Lima, 2013).

Interdisciplinary Pain Management Program (IPMP): IPMP includes coordination of services and frequent communication among a variety of health care professionals (e.g., medical, psychological, physical therapy, and occupational therapy) all under one roof (Gatchel et al., 2014).

Medical Treatment Utilization Schedule (MTUS): *MTUS* is used in California by third party insurance payers when determining if a patient will be given authorization to attend an IPMP (MTUS, 2009).

Quality of life: Quality of life refers to the individuals' overall satisfaction with their lives based on how well their needs, goals, and wishes are or are not being met in important areas of their lives; these areas include health, self-esteem, goals and values, money, work, play, learning, creativity, helping, love, friends, children, relatives, home, neighborhood, and community (Scascighini, Litschi, Walti, & Sprott, 2011).

Assumptions

An assumption of this research was that the participants would be forthcoming and honest in answering survey questions about their self-perceived disability, their self-perceived quality of life, and their experiences of chronic pain before and after treatment. Another assumption was that the results from the sample tested and analyzed, drawn from the Summit Pain Management Institute, would be representative of other chronic pain patients' results as well.

The necessity of these assumptions was that without an expectation of honesty from the patients, the study would not be valid. Additionally, while chronic pain is an individual experience, the assumption that the overall experience of chronic pain can be generalized to other patients in other areas of California has already been made by other researchers (Lumley et al., 2011).

Scope and Delimitations

The patients in this research all have chronic pain which means their pain has lasted longer than 6 months. The patients all have different types of pain, and the sources of their pain may or may not be known. In this study, I focused on how the patients' attitudes affected their perception of the pain, not whether their pain was actually relieved. Through this research, I asked the question, "Does one's self-reported quality of life before treatment affect one's post-treatment outcomes?" The focus of this research did not include the pathology of the patients' pain. As Held (2002) mentioned, happiness and well-being are subjective experiences and cannot be applied in a general sense. However, in this study, each patient's self-reported quality of life was compared to that same patient's outcomes, allowing for the subjectivity and individuality of each patient's experience of pain and well-being. In this study, I captured the perspectives of the chronic pain patients, not third party insurance payers. This research was built upon the theoretical foundation already established by the field of positive psychology, in that I demonstrated the generalizability of positive attitudes regarding life and overall well-being, despite contexts which could be perceived as negative.

Limitations

Because I focused on California-specific guidelines, the generalizability of the findings to states with alternate medical use schedules, guidelines, or relationships between third party insurance payers and chronic pain patients may not be possible. Limits to this research also included a general lack of objective information regarding chronic pain. Because pain is a subjective experience, it is difficult to quantify. Additionally, pain is not a comparable experience from one person to another. What one person describes as a pain threshold of 4, for example, is not necessarily the same as another person's experience of pain at a threshold of 4. These two experiences of pain thresholds of 4 are, therefore, not comparable. An additional limitation of this research was that the term quality of life is also a subjective term. No one definition exists for quality of life, which makes researching patient quality of life both before and after an injury difficult. The operationalized definition of quality of life used in this study can be found in the Definitions section. Despite these limits, researchers have published numerous studies and dissertations on chronic pain, which are explored in depth in Chapter 2.

Significance

Previous researchers have established the effectiveness of IPMPs in the treatment of chronic pain (Gatchel et al., 2014). However, third party insurance payers need a way to determine which chronic pain patients will gain the most benefit from an IPMP. In California, the MTUS guidelines are used by third party insurance payers when determining if a patient will be given authorization to attend an IPMP (MTUS, 2009). Generally, no definitive research exists on what is considered the gold standard for assessment and treatment (MTUS, 2009). More specifically, one of the criticisms of the MTUS guidelines of IPMPs is that they lack appropriate screening tools to determine which patients will benefit from treatment (MTUS, 2009). The MTUS guidelines, (2009) state that research is ongoing to evaluate screening tools prior to entry into an IPMP. Part of this ongoing research includes examining what screening tools provide the best predictive information for patient success.

I hope to influence social change to help chronic pain sufferers access care, thus reducing patient suffering and the cost to the U.S. economy. From a cost perspective, it is critical for third party insurance payers to be able to more effectively determine which patients will most benefit from an IPMP and get these patients in treatment as soon as possible. The sooner chronic pain sufferers gain control over their pain, the sooner they can resume living their lives. Chronic pain affects more than just the sufferer. Businesses and communities are affected by the pain sufferers' inability to work and the potential financial instability of lost income (Dopson, 2010). Families are affected by the pain sufferers' depression and anxiety (Park & Sonty, 2010). Social relationships are affected by the pain sufferers' propensity to isolate themselves (Park & Sonty, 2010). By providing evidenced-based selection criteria for third party insurance payers, patients will receive treatment sooner, which will reduce the social and financial impact of pain to the patient and society.

In this study, I examined whether the IV of patients' perceived quality of life as measured by the QOLI can be used to predict patients' success in an IPMP. I addressed the problem of the absence of research regarding patients' perceived quality of life and the affect perceived quality of life may have on how effective IPMPs are for patients experiencing chronic pain. The findings of this study are significant because they will provide the field with predictive information that can help patients access the most effective care for their needs. These findings will not only change the way chronic pain patients are evaluated for potential treatment opportunities, but will also change the way that researchers, practitioners, and the next generation of practitioners in the field understand how to study and treat the ongoing suffering of chronic pain patients.

Summary

Chronic pain is a driving force of lost productivity and health care use, and it a growing problem in the United States, effecting approximately 100 million people in the United States and costing an estimated $560–635 billion annually (Institute of Medicine, 2011; Lumley et al., 2011). In addition, chronic pain exacts significant physical, emotional, and psychological tolls on individuals as well (Lumley et al., 2011). Because biopsychosocial models recognize the complex interactions of the psychological, social, and physiological dimensions of pain, the most effective pain management interventions are IPMPs that are typically founded on biopsychosocial approaches. In the state of California, for example, strict MTUS guidelines must be followed before third party insurance payers can make IPMPs available to chronic pain patients. However, third party insurance payers are hesitant to approve such programs because of their upfront cost and short-term nature. However, if third party insurance payers had better selection criteria to determine who would be successful in an IPMP, then payers may be more inclined to approve IPMPs for patients, thus reducing patient suffering and the cost to the U.S. economy. Quality of life indicators that focus on the social, emotional, psychological dimensions of satisfaction and well-being may be well suited for the assessment of chronic pain patients. Consequently, the results of this study may provide third party insurance payers with a way to determine which chronic pain patients will gain the most benefit from an IPMP, thus transforming the way the field understands the treatment possibilities for chronic pain patients.

In Chapter 2, I go into more detail on the theoretical framework and elaborate on the two different approaches informing the treatment of chronic pain—the biomedical and the biopsychosocial models of pain, as well as the tenets of positive psychology. In Chapter 2, I also discuss the key concepts and the variables used in this study in relation to current studies. These concepts and variables include the financial and social effects of chronic pain, quality of life factors, and tools for assessing quality of life and disability.

Chapter 2: Literature Review

Introduction

Positive emotion and the tendency to catastrophize pain are both indicators of perceived pain severity as well as perceived disability (Ong et al., 2010). According to the MTUS guidelines , pretreatment levels of pain and psychological distress are also predictive factors in outcomes of pain treatment. However, pretreatment levels of pain and psychological distress minimize the importance of patient positivity and the patient's ability to influence his or her future success in functional restoration. The purpose of this study was to analyze the correlation between patient positivity and pretreatment levels of pain with patient outcomes.

This review is organized into three sections. The first section includes the etiology of pain and the physical, social, and financial effects of pain. The discussion of the effects of pain includes data regarding the emotional result of chronic pain on an individual as well as on the individual's support system. Data are presented regarding the financial effect of chronic pain on the United States and on the individual. I also explore current methods for the treatment of chronic pain and assess these methods' efficacy. I then address quality of life for individuals with chronic pain. Current literature and research regarding the various aspects of quality of life and how quality of life can influence positive outcomes for individuals with chronic pain are discussed. An exploration of why quality of life is important to address in chronic pain patients and what quality of life assessments are currently in use is presented. Finally, I use current literature to support the use of patient perceived quality of life as a predictor of patient life satisfaction and perception of disability. In the third section of this review, I address the mind-body connection. Additionally, conflicting research regarding predicting patient life satisfaction and perception of disability by using self-assessments is addressed. Finally, I review the literature related to the use of differing methodologies for positive outcome prediction to assess the potential reliability and validity of this study.

Literature Search Strategy

The primary strategy for comprehensively searching current peer-reviewed literature included the use electronic databases. I used PsycARTICLES, PsycINFO, Psychology: A SAGE Full-Text Collection, PsychEXTRA, Academic Search Complete, Educational Resources Information Center (ERIC), Education Research Complete, Google Scholar, and SocINDEX with Full Text to search for peer-reviewed journal articles and research, with a focus on those articles current within the past 5 years. The date ranges used were 1975–2014, and limiting search options included full text, English, and peer-reviewed journals. The date range was expanded to include foundational studies as well. Age, sex, and geographical location were not used as limiting factors. I used the Internet to access agencies such as the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO). Finally, libraries and bookstores in the greater Sacramento, California area were used to search for relevant literature and research. Search terms included *pain, chronic pain, mind body, mind body and chronic pain, quality of life, quality of life and chronic pain, acute pain, positive psychology, positive psychology and pain, positive psychology and chronic pain, pain* *experience, Held and positive psychology, Seligman and Csikszentmihalyi,* and *positive psychology*. The scope of the following literature review includes foundational research as well as peer-reviewed research current within the past 5 years.

Theoretical Foundation

The biopsychosocial model of pain and positive psychology as it relates to pain was used as theoretical bases to undergird and contextualize this study. Biopsychosocial models of pain represent current thinking on pain and include considerations of biological, psychological, and social factors in how individuals conceptualize and experience pain. Positive psychologists espouse that positive thinking and positive emotions can increase a person's life satisfaction and quality of life. How individuals experience pain can be influenced by positive emotions and positive thinking (Wong, 2011).

Biopsychosocial Model of Pain

The biopsychosocial model of pain is the most widely accepted perspective for understanding the complexities and treatments of the focus of this study, chronic pain (Gatchel et al., 2014), and is a key aspect of the theoretical foundation of this study. Biopsychosocial models of pain oppose traditional biomedical approaches to pain that view the mind and body as two distinctly separate entities (Lumley et al., 2011). Biopsychosocial models of pain rely on a differentiation between two different things, which the public may understand as one and the same: nociception and pain. Unlike nociception, which is the stimulation of nerves which transfer information about possible tissue damage to the brain, pain can be understood as a much more subjective experience

(Gatchel et al., 2014). Gatchel, Peng, Peters, Fuchs, and Turk (2007) described pain as "the subjective perception that results from the transduction, transmission, and modulation of sensory information. This input may be filtered through an individual's genetic composition, prior learning history, current psychological status, and sociocultural influences" (p. 582). In addition, pain-related emotional reactions and psychological cognitions can influence chronic pain experiences and perpetuate cycles of nociception, distress, and disability (Gatchel et al., 2014). When it comes to pain, it is not a simple matter of transferring information from the body to the brain; there is no simple isomorphic connection between nociception and pain (Gatchel et al., 2014). Rather, pain is a complex interaction of biological, psychosocial, and social factors (Gatchel, 2004) that can differ from one person to another.

The idea that the mind and body are connected is not a new concept. Gatchel et al., (2014) observed that even biological processes contributing to pain have roots in emotional reactions and psychological cognitions; nociception can involve immediate emotional response, while cognitions attach meaning to the emotional experience of pain. The treatment of chronic pain is multifaceted and complex. Possibly most distressing to those who are experiencing chronic pain is the fact that "despite advances in knowledge, technology, and procedures, no medical treatment has been demonstrated to consistently and completely alleviate the chronic pain of all of those afflicted" (Rogerson et al., 2010, p. 382.) The treatment for chronic pain is not an exact science because each individual's pain experience is different (Rogerson et al., 2010). The typical treatment for chronic pain has included opioid pain medication, self-limitation, surgery, psychological intervention, and physical therapy (Rogerson et al., 2010). While no effective cures for chronic pain exist, treatment could be made more effective by employing a biopsychosocial approach to chronic pain with an emphasis on how patients view their quality of life at the time of beginning treatment. Regarding the biopsychosocial model, Gatchel et al. (2007) have argued that it "focuses upon the unique relationship among biological, psychological, and social factors which contribute to how well an individual responds to health problems, including pain" (p. 582). The biopsychosocial model "recognizes pain as a complex perceptual experience influenced by dynamic and reciprocal interaction among biological, psychological, and sociocultural factors" (Rogerson et al., 2010, p. 383). This model was developed to better align the biomedical and the biopsychosocial models of pain to encompass a holistic view of the patient and his or her experience of chronic pain.

Pain is not merely the bodies' responses to actual or potential tissue damage (Laisne, Lecomte, & Corbiere, 2012). This phenomenon can be seen in such occurrences as the person who has bulging discs visible via an MRI but who experiences no pain; or the person who has no physical evidence of damage, but who expresses feeling immense pain. From a biomedical model perspective, pain is the resultant experience of stimulated nerve endings sending a message to the brain (Manjiani, Paul, Kunnumpurath, Kaye, & Vadivelu, 2014). Pain is the brains' response to a message that says, this hurts, this is painful. If the experience of pain was limited to actual or potential tissue damage then the person who has physical damage would, in turn, experience pain and, likewise, there would be no pain without damage. This line of thinking, however, has proven not to be accurate and has left many scientists baffled as to what, exactly, causes pain. Hence, the biopsychosocial model of pain was developed in response to the biomedical model of pain.

Medical professionals and insurers often use the biomedical model of pain, or the disease model of the human body, to decide on appropriate treatments (Bruns et al., 2012). According to the disease model, pain is a disease that focuses only on symptom presentation and reduction of symptoms (Lechnry & Lechnry, 2010). This treatment model limits the practitioner to only what is presented physically by the patient, as opposed to looking at what other causes may exist for the experienced pain (Lechnry & Lechnry, 2010). According to Bruns et al. (2012), many times people must try various alternative methods for treating chronic pain before they find the one that works for them because an individual's symptoms are not limited solely to physical ones. Furthermore, Laisne et al. (2012) contended that the search for a cure to chronic pain often brings up one or more buried emotional issues that must be dealt with in order to deal with the pain. This acknowledgement that emotions play a role in how pain is perceived raises a question as to how a person's emotional state prior to injury might influence his or her recovery. For example, a connection exists between previous sexual abuse and chronic pain (Lechnry & Lechnry, 2010). While a history of sexual abuse is not sufficient to make a prediagnosis of a propensity toward chronic pain, when taken in context with the other available literature on the subject, this finding supports a mind-body connection in the perception and experience of pain. This connection recognized by biopsychosocial models should be considered when assessing patients for chronic pain treatment methods and eventual treatment outcomes. Because biomedical models focus on treating physical symptoms of chronic pain, treatment intervention primarily includes opioid medication and surgery that may lack long-term benefits and subject patients to unnecessary risk (Gatchel et al., 2014). While current guidelines for pain management treatment assessment such as MTUS recognize biopsychosocial models of pain, research is ongoing for effective and reliable assessment measures that consider the factors of biopsychosocial pain models. This demonstrates the importance of the biopsychosocial model of pain in response to more traditional biomedical models of pain and highlights the need for assessment tools that align better with biopsychosocial models of pain.

Positive Psychology

Positive psychology was another theoretical foundation used for this study. Positive psychology was first introduced as a field of study when Seligman and Csikszentmihalyi introduced a "science of positive subjective experience, positive individual traits, and positive institutes to improve quality of life and prevent the pathologies that arise when life is barren and meaningless" (p. 5). At that time, the trend in the psychological community was to analyze individuals from a risk model perspective, which assumed that if individuals were exposed to certain risk factors (i.e., abuse, neglect, or divorce) they would not necessarily exhibit poor mental health (Zautra, Arewasikporn, & Davis, 2010). Seligman and Csikszentmihalyi believed that the psychological community had an obligation to not only heal people who had suffered emotional trauma but also to explore what made ordinary people happy and able to flourish. According to Seligman and Csikszentmihalyi, psychology is more than “repairing the worst things in life; it is also about building positive qualities” (p. 5). The idea that psychology could and should be used to help people become happier, emotionally stronger, and more content was novel at the time. Positive psychology, as a field, does not discount that tragedies exist in life, nor does it imply that a positive outlook will fix all of life’s problems. However, a person should work toward an emotionally healthy self by focusing on finding courage, optimism, hope, honesty, and perseverance (Seligman & Csikszentmihalyi, 2000).

Significant links exist between catastrophizing pain (i.e., exaggerated negative responses to pain) and how individuals experience chronic pain (Ong et al., 2010). Consequently, positive emotions, such as those espoused by the tenets of positive psychology, can decrease pain catastrophizing and, as a result, affect how an individual experiences pain (Ong et al., 2010). Catastrophizing pain contributes to pain in three related areas: severity, disability, and emotional stress (Ong et al., 2010). In their study of the influence of positive emotions on how patients catastrophize chronic pain, Ong et al. (2010) sampled 95 men and women with chronic pain via questionnaire and analyzed participants’ daily diaries in which they reported on their pain experiences, as well as associated positive and negative emotions for 14 consecutive days. Ong et al. found that psychologically resilient individuals, measured by the Ego-Resiliency Scale, reported a decrease in daily pain catastrophizing through experiencing positive emotions, such as feeling enthusiastic, happy, proud, joyful, and satisfied. The findings were important for positively linking positive emotions to protective factors such as resiliency and the experience of chronic pain. However, because chronic pain is by definition a condition that persists over time, longitudinal studies were recommended to understand more fully how positive emotions affect and alter the experience and management of chronic pain for extended periods of time.

Positive psychology encourages patients to focus on positive aspects of life but the negative aspects and experiences in life have value also. In a meta-analysis of positive psychology, Wong (2011) provided a summary of research on the topic and offered more comprehensive ways of thinking about the effects of positive psychology in individuals' lives. Wong observed that by focusing on the positive aspects of life over negative ones previous approaches in positive psychology set up an artificial positive-negative dichotomy that discouraged research on how overcoming negative experiences can build character strength and protective resilience. Wong argued that overcoming the "tyranny of positivity" (p. 70) as a research focus in the area must involve the study of the complexity of life in its positive and negative totality, and this must include study of the interaction between positive and negative aspects of life. In addition, Wong offered the following four foundations on which to base new conceptualizations of positive psychology: virtue, meaning, resilience, and well-being. The two foundations related to chronic pain and this study are resilience and well-being. Resilience refers to an individual's protective factors that allow him or her to cope with illness and pain, as well as bounce back from trauma (Wong, 2011). Resilience is the process of addressing, adjusting to, and overcoming setbacks and obstacles (Wong, 2011). From this process, individuals may experience personal growth and increased fortitude (Wong, 2011). Because chronic pain can be seen as a stressor that can exceed beyond routine coping capacities (Wahl et al., 2009), resilience may act as a protective factor connected to adaptation and growth associated with increased quality of life (Wong, 2011). According to Wong, well-being is an umbrella term referring to a combination of happiness, good health, and optimal individual functioning. Health is a key factor of quality of life, and Wong found that good health and living conditions were associated with positive outcomes and poor health and living conditions were associated with negative outcomes. This aligns with Wahl et al.'s study on quality of life wherein they found that patients experiencing chronic pain reported a variety of significant comorbid conditions, including disability and poorer physical and mental health, as well as emotional disturbances, anxiety, depression, fatigue, and sleep disturbances. These comorbid conditions play roles in a patient's experiences of chronic pain and his or her tendency to catastrophize pain (Borsbo et al., 2010; Ong et al., 2010).

Optimism is another positive emotion associated with positive psychology that has been linked to how individuals experience and adjust to chronic pain. Keefe and Wren (2013) characterized optimism as a trait-like variable that has been shown to be connected to how individuals respond to stressful situations, including pain (Meevissen, Peters, & Alberts, 2011; Peters, Flink, Boersma, & Linton, 2010). Meevissen et al. (2011) and Peters et al. (2010) found that patient optimism could be increased through Best Possible Self interventions, by having patients write about and visualize their best possible selves. Meevissen et al. found that positive thinking about the future increased positive affect and future expectancies, and Peters et al. found that imagining a best possible self enhanced levels of optimism. Keefe and Wren noted that work on optimism and pain represents an important avenue of research because positive emotions have been linked to individual adaptive psychological resources (resiliency and mindfulness), social resources (friendship and social support), and physical resources (engaging in healthy behaviors and immune functioning). However, much more work on the connection between pain and optimism is needed.

Literature Review Related to Key Variables

Despite the extensive amount of literature regarding the cost of pain, the actual social and financial outcomes remain vague. This is not to say that any failures exist on the part of the researchers who are trying to determine the cost and effects of chronic pain. Rather, it speaks to the illusiveness and individuality of the pain experience. Pain can be viewed as an equalizer of all men and women, for while it is a completely individual experience, it is also a universal experience that does not discriminate based on race, creed, gender, or financial status. With the capacity to demoralize and socially isolate, pain and all of its subsequent interactions, is difficult to fully determine (Kumar, Gupta, & Maurya, 2010). The studies below provide some insight into the research that has been done thus far on the financial and social results of chronic pain and the gaps in literature that remain to be filled.

Financial Result of Pain

Financially, the patient and the family suffer because of lost work and mounting medical expenses. Businesses and the economy in general suffer because of the increased cost of lost labor (paid for in sick days and workers' compensation claims) and lost disposable income (Dopson, 2010). The medical community becomes overburdened with running tests to try and determine the cause of the chronic pain, which includes trials and more trials of different interventions and costly prescription drugs. According to Bruns et al. "In 2009, the total National Health Care Expenditure (NHE) in the United States was $2.5 trillion dollars" (2012, p. 81). The NHE is made up of historical data that measures current annual health care spending as well as projections of future health care spending (Centers for Medicare and Medicaid Services, 2012). Other estimates put the annual economic cost of chronic pain in the United States at $560-$635 billion (Gatchel et al., 2014). Current research suggests that the cost of treating chronic pain is rising at a faster rate than other types of health care expenditures. Indeed, the most common forms of chronic pain (back, neck, and spine injuries) are rising at a triple digit inflation (Bruns et al., 2012).

As many as 116 million Americans and one in five people in Europe currently suffer from chronic pain (Dopson, 2010). The American Academy of Pain Medicine (2012) reported that chronic pain:

> costs society at least $560-$635 billion annually, an amount equal to about $2,000.00 for everyone living in the United States. This includes the total incremental cost of health care due to pain from ranging between $261 to $300 billion and $297-$336 billion due to lost productivity (based on days of work missed, hours of work lost, and lower wages). (para. 2)

Additionally, chronic back pain is the number two cause of missed work, second only to the common cold, with 119 million working days lost per year because of pain (Dopson, 2010). The problem of back pain alone cost the United States over 96 billion dollars a year (Mehra, Nicholl, & Schadrack, 2012). It is estimated that chronic pelvic pain affects approximately 15% of women in the age group of 18–50 years (Kumar et al., 2010). Additionally, it has been reported that "Chronic pain impacts the lives of 100 million Americans and cost the United States and estimated $100 billion per year" (Collen, 2010, p. 50). Still, while there are many sources of chronic pain, medical interventions are largely limited to opioid medication and surgery that may lack long-term benefit or subject patients to unnecessary risks (Gatchel et al., 2014; Louw, Pentedura, & Mintken, 2012). In addition, the continued failure of interventions exacerbate the myriad of comorbid psychological and social issues that accompany the experience of chronic pain (Bosy, Etlin, Corey, & Lee, 2010) and obviate the need for alternative approaches (Gatchel et al., 2014).

Researchers have studied the cost of chronic pain in European contexts as well. For example, Gannon, Finn, O'Gorman, Ruane, and McGuire (2013) studied the direct and indirect cost of chronic pain in patients attending a pain management clinic in Ireland. The researchers observed that previous research often focused on the economic costs or burden on the wider, usually national, population and sought to examine the costs to the very patients attending a chronic pain clinic and receiving specialized pain management services. The researchers asked what the direct and indirect economic costs of chronic pain were for participants attending a pain management service for a year and what factors explained variations in costs. Researchers sampled 100 patients suffering from chronic non-cancer pain attending a pain management clinic at Galway University Hospital. Direct costs included all medically-related factors, including inpatient and outpatient visits, emergency room visits, ambulance costs, in-home help and equipment, nurses, and the cost of health insurance. The average annual cost per attendee in U.S. dollars was $10,791. Indirect costs included the cost of unpaid work, disability as a result of pain, and the cost of informal care. The average annual cost per attendee in U.S. dollars was $13, 252. Gannon et al. (2013) found that the main driver for direct pain management costs were hospital costs, comprising 44% of the total direct cost. Lost work days were the main driver of indirect chronic pain costs, representing 39% of total indirect costs, indicating the need to get people with chronic pain back to work as soon as realistically possible; the mean number of lost work days was 20 for the year. They noted that the reduced quality of life resulting from chronic pain is an extremely important consideration, but admitted that, as an intangible cost, it is difficult to quantify in economic terms and, consequently, was beyond the scope of their study. Their study was important, however, for providing individual-level information on the cost of pain management to those attending pain management programs and what factors explained variations in cost.

Social Results of Pain

The consequences of chronic pain can be measured not only in economic costs but understood in how the social functioning and quality of life of individuals is affected as well (Casey, 2014; Laisne et al., 2012; Park & Sonty, 2010). Because there are many causes of chronic pain and because chronic pain is connected to comorbid conditions such as anxiety, depression, fatigue, and sleep disturbances (Ong et al., 2010), some researchers have studied behavioral patterns related to chronic pain (Casey, 2014; Park &

Sonty, 2010). Chronic pain can comprise a cluster of comorbid problems that, when added together, have social effects reaching far beyond the costs and primary losses related to injury (Laisne et al., 2012). These can include hypochondriasis, hysterical symptoms, depression, anxiety, and insomnia (Kumar et al., 2010) that can result in significant emotional distress and diminished quality of life (Laisne et al., 2012). Socially, patients can become angry, anxious, depressed, and inactive; consequently, these conditions can lead to withdrawal, isolation, alienation, and a decreased level of social life in general (Casey, 2014). Chronic pain may result in pain-related interference in social and recreational activities with family and friends, weakening social and familial relationships and decreasing socially-related quality of life factors (Park & Sonty, 2010). Furthermore, relationships that were previously important to chronic pain patients with family and friends can become damaged or completely severed (Park & Sonty, 2010), compromising potential sources of psychological resilience and social support (Casey, 2014). In addition, the experience of chronic pain can be related to wider social factors. According to Scascighini et al. (2011), socioeconomic status, ethnicity, race, smoking, diet, and gender all play a role in the prevalence of chronic musculoskeletal pain, although the direct connections between race, ethnicity, and chronic pain are not clear.

The possibility that chronic pain conditions may have no definitive cure also can exacerbate issues related to restricted social functioning (Cowan, 2011). Often, individuals mistakenly believe that a visit to their health care provider will not only determine the precise cause of their chronic pain, but also, more importantly, find a solution or cure to end their pain (Cowan, 2011). Because biomedical approaches to chronic pain emphasize surgical intervention, individuals often believe that their pain is temporary and curable, and once fixed, they can go back to their normal lives (Cowan, 2011). As time goes on, however, the condition of chronic pain may be diagnosed after repeated ineffective medical interventions. Individuals may begin to lose hope of ever finding a cure to their pain, and they may begin to socially withdraw. They may begin to develop pain-related fear and severely restrict movements and activities, including social functioning, that may produce a flare-up of pain (Damsgård, Dewar, Røe, & Hamran, 2011). However, by focusing on individual and social protective factors, such as resilience and social support, biopsychosocial approaches to pain management aim to help patients minimize, manage, cope, and live with chronic pain conditions that may have no cure, thereby improving their quality of life and social functioning (Sessle, 2011).

Assessment in Use

Before pain becomes chronic, the pain is first acute. Again, acute pain is pain that lasts from 0 to 6 months. After this period of time, if the pain is still present it is considered chronic. If one is to relate the experience of initial injury to the experience of head- and neck- cancer diagnosis and treatment, then at the 6 month point a patient would be, theoretically, done with treatment and into the recovery of function phase. At the 12 month point, the head- and neck- cancer patient would be well into the recovery phase while a chronic pain patient would be newly diagnosed as chronic. In both situations, the pretreatment levels of depression are important risk factors for the patients' recovery. The overall process of diagnosis and recovery are similar for an injury and cancer—that is, if things all go as planned. If things go as planned, a cancer patient gets diagnosed and treated, and then they are on the road to recovery. If things go as planned for an injured person, they are first diagnosed as to the cause of injury, then treated, and then, like cancer patients, they are on the road to recovery. It should be noted, however, that for patients who have higher levels of pretreatment depression, the process of diagnosis, treatment, and recovery may be impeded. This impediment can have a significant effect on the recovery process and future outcomes.

As has been presented, a patient's psychological functioning before injury, after injury, at the onset of treatment, and during treatment can all have a significant effect on the efficacy of treatment outcomes. Several measures for assessing a patient's psychological functioning by measuring quality of life are already in use. These include, but are not limited to, the Health Related Quality of Life (HRQOL), the QOLI, the World Health Organization's measures (WHOQOL-100) and the 26-item questionnaire (WHOQOL-BREF). The purpose of these quality of life measures is to assess an individual's overall satisfaction with their quality of life, which includes factors such as their physical, mental, emotional, and social functioning (HealthyPeople.gov, 2010). Positive aspects, such as positive emotions and life satisfaction, are assessed with these measures (HealthyPeople.gov, 2010). Since quality of life measures are designed to measure positive aspects of one's life, it is worth mentioning the Dispositional Hope Scale as another quality of life measure.

QOLI. QOLI is a well-known and widely used construct, and it has been adapted as a measurement tool to focus on different areas of life (e.g., Global Quality of Life and

HRQOL and for use in other countries (e.g., the Quality of Life Scale, Norwegian version and the Quality of Life Scale (QOLS), Korean version; Choi et al., 2014; Wahl et al., 2009). John Flanagan developed the QOLS in the 1970s, and it has since be adapted for use in chronic illness groups (Wahl et al., 2009). In this section, quality of life is used as an encompassing term to describe a broad range of human experiences related to the scale and an individual's view of his or her overall well-being and his or her life satisfaction (Choi et al., 2014). Quality of life seems to be both an easily understood concept but, at the same time, rather elusive as well. What is not in question, however, is the idea that quality of life is negatively affected by chronic pain (Borsbo et al., 2010). Quality of life refers to individuals' overall satisfaction with their lives based on the degree that their various needs, goals, and wishes are or are not being met in important areas of their lives; these areas include health, self-esteem, goals and values, money, work, play, learning, creativity, helping, love, friends, children, relatives, home, neighborhood, and community (Scascighini et al., 2011).

The relationship between chronic pain and quality of life is one that continues to be researched with varying results. For example, according Kumar et al. (2010), mental health and mood states are directly associated with the onset of chronic pelvic pain and endometriosis. To lend further credence to the idea that regret can play a role in depression and quality of life, Kumar et al. studied the connection of the mental conditions of depression and alienation and chronic pain in endometriosis patients. The researchers were actually looking at how different conditions (in this case, chronic pelvic pain and endometriosis) effect quality of life, depression, and alienation among women

(Kumar et al., 2010). What the researchers found was that both the chronic pelvic pain and endometriosis patients experienced a lower quality of life and higher depression and alienation rates (Kumar et al., 2010). Specifically, this study showed that chronic pelvic pain patients scored worse in all quality of life categories compared to endometriosis patients and the control group. This finding begged the question of why chronic pelvic pain patients reported more depression and feelings of alienation and less satisfactory qualities of life.

One hypothesis that should be considered is the working definitions of each of these conditions the researchers used. According to Kumar et al., "chronic pelvis pain is the pain that apparently has a gynecological origin for at least 6 months but of which no definitive cause is found" (p. 154). The pain can (and often is) widespread in the pelvic area. In contrast, "endometriosis is a lower abdominal pain due to foci of ectopic endometrium located outside the uterus." (p. 154). When looking at both definitions, one aspect of chronic pelvic pain that stands out is that, when compared to endometriosis, no definitive cause of the pain exists. The researchers also found "that persons with chronic pelvic pain and endometriosis may have negative expectations about their ability and their future and they view themselves as helpless and unable to control their life" (Kumar et al., 2010, p. 153). The lack of knowledge regarding the cause of the pain, and, further, the pain trajectory, are important factors in a patient's overall view of his or her quality of life. While both chronic pelvic pain and endometriosis patients experienced depression, alienation, and lower quality of life, the group with less control and knowledge about their future abilities scored significantly worse. This could reinforce the hypothesis that having future goals available is a protective factor against a lower quality of life following life regret.

While the Kumar et al. study showed that individuals' inability (perceived or actual) to control their lives increased individuals' negative expectations, it should be taken into consideration who, exactly, does the patient need to feel is in control of the decisions regarding treatment of their condition. For example, patients may feel that the physicians who treat them are in control, or that the insurance companies who pay and oftentimes determine their treatments are in control of these important decisions concerning treatment. Perhaps the patient feels that the injury itself is in control of his or her life and mood, and thereby his or her overall quality of life. Situations exist in which patients feel that someone is in control of their lives and happiness, and patients are not happy about this loss of control. In other situations, patients may feel a sense of relief to give control to someone or something over a condition that is beyond the patient's control.

Perhaps more of a correlation exists between the onset and recovery of other illnesses and chronic pain onset and recovery than has been realized or understood. Take, for example, the study by Howren, Christensen, Karnell, and Funk (2010), in which the researchers investigated whether an assessment of depressive symptoms before the start of cancer treatment might predict lower HRQOL after treatment was concluded. Similar to chronic pain patients, Howren et al. found that depressive symptoms are common among cancer patients and often occur throughout the course of the cancer treatments, even sometimes continuing on months after cancer survivors have finished treatment

(2010, p. 65). In cancer and chronic pain patients, then, a clear trajectory explains the typical stages of illness and injury recovery. Cancer patients follow the initial diagnosis, treatment, and follow-up care trajectory. In the situation of chronic pain, patients usually follow an initial injury, initial medical treatment, and finally a follow-up treatment. In both of these situations (cancer and chronic pain), doctors make the assumption that patients are getting better with treatment. However, what if this assumption is not realized? Howren et al. defined lowered HRQOL as, "disruptions of essential daily functions such as deficits in eating and speech that often undermine patient functioning as well as contribute to disruptions of family and other social activities" (p. 66). This definition sounds eerily similar to how quality of life is disrupted in the lives of chronic pain patients. This connection is important if one is to draw HRQOL comparisons between the chronic pain population and the head- and neck-cancer survivor population.

Howren et al. hypothesized that, "higher levels of pretreatment depression symptoms would serve as a risk factor for diminished HRQOL at both the 3 and 12 month follow-ups" (p. 66). The researchers explored if the recovery function that would normally be seen in head- and neck-cancer patients after 12 months would be affected by their pretreatment levels of depression. The results of this study indicated that the presence of depressive symptoms did, in fact, seem related to HRQOL outcomes. Howren et al. found that "Specifically, pretreatment depression scores predicted poorer pretreatment adjustment HRQOL at 3- and 12- month follow-up assessments in the head and neck cancer specific domains of speech, eating, aesthetics, and social disruption after controlling for several covariates, including stage of disease" (p. 68).

Choi et al. (2014) studied how chronic back pain influenced quality of life in a cross-sectional Korean population, observing that lower back pain and associated disabilities are becoming a growing concern in industrialized nations. Because of the subjective, complex, and individualistic nature of chronic pain, patient-reported and subjective outcomes, such as quality of life, are crucial to health care and pain research (Choi et al., 2014). The researchers' purpose was to explore the effect of chronic lower back pain on individuals' quality of life to better understand treatment practices and satisfaction with treatment in patients suffering from chronic lower back pain. Choi et al. used questionnaires and Korean versions of both the Oswestry Disability Index and the 12-item Short Form Health Survey to survey 3,121 patients of chronic lower back pain. The Oswertry Disability Index has proven to be a reliable and valid indicator of patients' impression of their own state of disability, and the Short Form Health Survey includes eight domains related to physical and mental functioning and overall HRQOL (Choi et al., 2014). Using ANOVA to assess their data, Choi et al. found that while chronic lower back pain negatively affected patients' quality of life, 77% of participants were satisfied with current pain management, which included medication, physical therapy and therapeutic exercise, and injection therapy. In addition, there was significant correlation between pain intensity and pain management satisfaction: as pain intensity increased, satisfaction decreased (Choi et al., 2014). Importantly, the employed measurement tools functioned well, as doctors' and patients' pain assessment correlation was found to be good.

The Dispositional Hope Scale and optimism. The Dispositional Hope Scale has also been used as another quality of life measure, but more recent research is needed to determine if the scale remains a valid and reliable tool for chronic pain patients. Researchers have shown that hope is positively associated with positive effect, self-esteem, and mental and physical health, and positive life events have been linked to positive affect and positive outcomes (Hellman, Pittman, & Munoz, 2013). From a biopsychosocial perspective, it can be inferred that since positive life events can influence positive affect (Wong, 2011), this can in turn influence an individual's overall level of hope for the future. This level of hope for the future, then, may influence chronic pain treatment outcomes. The Dispositional Hope Scale is a 12 item self-report questionnaire which assesses an individual's hope by using the constructs of pathways and agency. The planning and perceived ability to reach one's goals is a large part of how hopeful a person will be (Hellman et al., 2013). Within the Dispositional Hope Scale, this planning and these perceived abilities to achieve goals are called pathways (Hellman et al., 2013). Agency is characterized as goal-directed determination (Hellman et al., 2013). Although recent study has confirmed the reliability of the Dispositional Hope Scale (Hellman et al., 2013) and although the Dispositional Hope Scale aligns with the precepts of QOLI and the tenets positive psychology, more work is needed if the Dispositional Hope Scale is to be used in the study of chronic pain patients.

However, researchers are coming to recognize optimism, an emotion similar to hope, as another positive emotion associated with positive psychology that may been linked to how individuals experience and adjust to chronic pain (Keefe & Wren, 2013).

Hellman et al. (2013) identified an important way that optimism differentiates from hope as a construct. With hope, expectations are goal-directed (i.e., individuals hope they will achieve their goals); whereas optimism involves a more general expectation of positive events (i.e., individuals feel optimistic about the future). Consequently, optimism may be better suited than hope for the study of how individuals respond to stressful situations and conditions, including chronic pain. This is because in some instances there is no cure (a goal-directed outcome) for chronic pain (Bruns et al., 2013). However, patients may be legitimately optimistic about the effective management of their chronic pain conditions (a more general positive outcome). In recent studies on optimism, Meevissen et al. found that positive thinking about the future increased positive affect and future expectancies, and Peters et al. found that imagining a best possible self-enhanced levels of optimism. Recent research on the relationship between optimism as a quality of life factor and pain represents a potentially important avenue of research because positive emotions have been linked to individual adaptive psychological resources (resiliency and mindfulness), social resources (friendship and social support), and physical resources (engaging in healthy behaviors and immune functioning; Keefe & Wren, 2013). Much more work on the connection between pain and optimism, however, is needed.

The problem of consistent assessment. The lack of consistent measures to assess chronic pain for patients represents a serious gap in the research literature with significant implications for chronic pain intervention and management (Choi et al., 2014). Not surprisingly, simply being a claimant is a poor predictor of long-term outcomes (MTUS, 2009). Guidelines, such as the MTUS, have been developed for doctors and assessment teams at the state level, while others recommend nationally recognized guidelines such as the Official Disabilities Guidelines (LeFevre, 2013). While MTUS recognizes biopsychosocial models of pain and the importance of IPMPs in treating chronic pain, third partythird party insurance payers are still reluctant to pay for IPMPs because of the lack of consistent assessment measures and information on which patients would benefit the most from such programs (Gatchel et al., 2014). Even though MTUS recognizes the biopsychosocial model of pain, interdisciplinary assessment based on physical, emotional, psychological dimensions, the use of IPMPs to treat and manage chronic pain, the document concedes that research remains ongoing as to what constitutes the gold-standard for chronic pain assessment (MTUS, 2009). Consequently, it is not known which group of patients benefit most from an IPMP, the ideal timing of when to implement treatment, the intensity of treatment necessary, and what is cost effective (MTUS, 2009). These problems remain and indicate that more research in this area is clearly needed. However, in their study of the connection between chronic pain and quality of life, Wahl et al. found that there was a complex relationship between chronic pain and quality of life. More recent research has shown that quality of life is related to emotional and psychological well-being and social functioning, which have been shown to facilitate protective psychological resources (resiliency and mindfulness), social resources (friendship and social support), and physical health (engaging in healthy behaviors and immune functioning) associated with positive outcomes in patients with chronic pain (Choi et al., 2014; Keefe & Wren, 201; Laisne et al., 2012; Park & Sonty, 2010; Wong, 2011). Recent research on the relationship between quality of life factors and chronic pain suggest that quality of life measurement tools may be the most suitable to date for assessing chronic pain patients’ response to IPMP approaches and intervention.

Summary and Conclusions

Chronic pain is a major factor in health care utilization and lost productivity, and it exacts a significant economic toll on society, as well as substantial emotional and psychological tolls on chronic pain sufferers (Lumley et al., 2011). IPMPs founded on the precepts of biopsychosocial models of pain that consider the social, psychological, emotional, and physiological aspects of pain have been shown to be effective in the management of chronic pain (Gatchel et al., 2014). However, assessment measures for those patients who would most benefit from IPMPs are inconsistent and underrepresented in the research literature. Consequently, insurance companies and third party insurance payers lack valuable predictive information and are reluctant to cover IPMPs even though biopsychosocial approaches have been shown to be effective in managing chronic pain.

Recent research has shown that the consequences of chronic pain are social as well as economic (Casey, 2014; Laisne et al., 2012; Park & Sonty, 2010). Chronic pain has long been known to be connected to comorbid conditions such as anxiety, depression, fatigue, and sleep disturbances (Ong et al., 2010). The comorbid conditions of chronic pain can significantly impact social functioning far beyond the costs and primary losses related to injury that can result in significant emotional distress and diminished quality of life (Laisne et al., 2012). Recent research shows that quality of life indicators that focus on social, emotional, psychological dimensions of satisfaction and well-being may be well-suited for the assessment of chronic pain patients (Choi et al., 2014; Keefe & Wren, 2013; Laisne et al., 2012; Park & Sonty, 2010; Wong, 2011). In addition, hope and optimism are quality of life factors that may hold promise as protective factors in the management of chronic pain (Keefe & Wren, 2013; Meevissen et al., 2011; Peters et al., 2010).

Quality of life is an individual experience which is inherently self-perceived. Looking at a person's life from the outside does not give one the experience of living that persons' life. For this reason, quality of life assessments must be done via self-reporting. Because of the subjective and individualistic nature of chronic pain, patient-reported and subjective outcomes, such as quality of life, are key to health care and pain research (Choi et al., 2014). It is the person's individual assessment of his or her pain and quality of life that matters as much as the substantial social and economic burden represented by chronic pain. Little research is available that offers conflicting theories about the importance of self-assessment in determining quality of life for chronic pain patients. A consideration that should be noted, however, is that because quality of life assessments are self-assessments, one person's experience of chronic pain cannot objectively be compared to another person's experience. A comparison can be made between a patient's quality of life at the beginning of treatment and his or her quality of life at the end of treatment, but a correlation cannot be made between two separate patients. This limitation can hinder the generalizability of whatever measure is being used to predict treatment outcomes.

In this population, the participants' experience not only an amount or frequency of pain than most people cannot even fathom, but they are also the unlucky recipients of surprise "break-through" pain, skepticisms from their health care providers, friends, and family, and feelings of betrayal by their own bodies. If positive emotion and the tendency to catastrophize pain are both indicators of perceived pain severity as well as disability (Ong et al., 2010), how does a chronic pain patient stay positive under the circumstances? According to the MTUS guidelines , pretreatment levels of pain and psychological distress are also predictive factors in outcomes of pain treatment. However, pretreatment levels of pain and psychological distress minimize the importance of patient positivity and the patient's ability to influence his or her future success in functional restoration. Based on this literature review, it is clear that significant relationships exist between pre-treatement self-perceptions of quality of life and post-treatement self-perceptions of quality of life, which include self-perceptions of disability. However, researchers have not yet explored these relationships as thoroughly as needed. The purpose of this study was to determine the correlation between patient positivity and pretreatment levels of pain with patient outcomes.

Consequently, this study employed the QOLI, in conjunction with the Oswestry Disability Index to measure individuals with chronic pain quality of life factors before and after participation in an IPMP. Chapter 3 sets forth the methodology used for this study, including the research design and rationale, the sample population, instrumentation, and data analysis procedures.

Chapter 3: Research Method

Introduction

The main focus of this study was to determine if a patient's perception of his or her quality of life affects their success in an IPMP. I aimed to disclose a link between patients' positive life outlook and the ability to fully use a program to manage their pain. In the following chapter, I outline the design to investigate the link, as well as the population and sampling procedures, and operationalization of research variables. I delineate the analyses and measures taken to test the research hypotheses. In the close of the chapter, I pose any potential ethical concerns and threats to validity, taking care to explain how these were addressed.

Research Design and Rationale

In this study, I used a quantitative methodological design. Because the goal of the research was to examine statistically significant effects of quantifiable (i.e., numerically measureable) concepts, this was the most appropriate method. I investigated the effects of quality of life perceptions on success in an IPMP. These concepts were measurable by the operationalization of the three measures of interest or variables. Quality of life measured a participant's perceptions regarding the quality of his or her life before treatment and was measured using the QOLI instrument; this was the IV. Success in an IPMP was determined by the Oswestry Disability Index administered both prior to participation in the program and at the end of the program. At each of these time points measurements was a self-rating in which participants rated their level of perceived disability; the difference between these two scores was the DV. Additional information was gathered from the demographic portion of the survey and defined participants as workers' compensation patients or other; this was an IV for the comparative aspect of the research.

I used a causal comparative approach to determine the effect of a patient's perceived quality of life after an injury on his or her success in an IPMP. Participants who were patients of workers' compensation could not be grouped at random. Because of the predetermination of groups (i.e., workers' compensation versus other) in this study, it could not be considered experimental. Because I also determined the effect of one measure, quality of life, on another taken at a later point in time, perceived level of disability, I followed a causal design.

In addition, the rating of disability was assessed between those who were workers' compensation patients versus other, necessitating a comparative aspect. For these reasons, a nonexperimental causal comparative approach was appropriate. Using archival data, I did not expect to encounter any significant time or resource constraints; the data of interest were already available and free of charge. The only cost incurred was that of the statistical software, which was the Statistical Package for the Social Sciences (SPSS) Version 21.0. The quantitative methodology described above is in line with the aims of the study as one goal of this research was to provide generalizable insights into how individuals' perceived quality of life impacts their success in IPMPs. The use of quantitative methods in examining numerical, measurable outcomes allowed for generalizability that would not be possible through alternative designs.

Methodology

Population

The population of interest for this research was patients with injury-related pain who attended an IPMP; both workers' compensation patients and all other patients were relevant to the study. Approximately 80 patients are admitted to the Summit Pain Management Institutes' program per year, and this composed the majority of the relevant population. Approximately 120 patients were needed for this study. Summit Pain Management Institutes' IPMP is a 5-week long program. Patients are admitted into the program only once. At the time they are admitted into the program, they are given the QOLI by a licensed psychologist and the Oswestry Disability Index by a physical therapist. Summit Pain Management Institute collected these data for nonresearch purposes. Patients were informed that their data could be used for organizational or research purposes and that all identifying information removed before use.

Sampling and Sampling Procedures

To gather participants from this population, convenience sampling strategies were employed. Using a convenience sampling strategy, I gained access to Summit Pain Management Institutes' program historical data. I contacted the owner of Summit Pain Management Institute to gain written approval to access the data set (Appendix A). Matched records were gathered for the QOLI, gathered before the program, and the Oswestry Disability Index (Appendix B), which was taken at two points in time (both before the program and after the program). No demographic information was collected from the archival source, with the exception of participants' status as a workers' compensation patient or not. Because data from this archive included all of the relevant variables of interest, they were the best source of data for use in this study.

Using this sampling method, it was important to gather a pool of individuals sufficiently large for the analyses. I used both regression analysis and a test of mean differences. The test of mean differences requires a larger amount of participants and was used to determine an overall sample size requirement. A two-tailed test was used, as differences in disability rating could be higher or lower for either group (workers' compensation patient versus other). Additionally, I expected to discover a medium effect size; however, this estimate was used because prior researchers did not indicate any potential effect sizes to expect between these two groups. Finally, a generally accepted power of .80, and an alpha level of .05 was used. The alpha level of .05 ensured that I was 95% confident that any significant findings were not because of random chance alone.

Using all of these aforementioned parameters, G*Power was used to calculate an appropriate sample to assure empirical validity. Based on these calculations, a sample of 128 participants, or approximately 64 workers' compensation and 64 other patients, was deemed sufficient for the study (Faul, Erdfelder, Buchner, & Lang, 2013). Thus, responses were gathered from each year over which surveys were distributed until a sample of 128 was achieved. Each year's responses were collected in their entirety, so more than the minimum number of participants could be selected if a certain year's data brought the sample size above the necessitated 128.

Instrumentation and Operationalization of Constructs

Data regarding the participants in the program were stored in the Summit Pain Management Institutes' program historical database and were measured using two instruments relevant to the study. Prior to participation in the program, participants were surveyed on their perception of quality of life. These data were collected through administration of the Quality of Life Inventory for adults instrument (A-QOLI). The QOLI was published by Ferrans and Powers in 1985 and is a multidimensional tool which quantifies the complexities of quality of life outcomes in adults. The QOLI, in its many forms, has been tested in prior research and validated in multiple studies, with Cronbach's alpha values ranging from .67 (i.e., questionable) for the activities of daily living scale, to .93 (i.e., excellent) for the occupational activities scale (Becker, Reib, & Shaw, 2014).

Quality of Life Inventory. The QOLI is based on 16 areas that constitute the measure of a person's overall quality of life. These 16 areas include health, self-esteem, goals and values, money, work, play, learning, creativity, helping, love, friends, children, relatives, home, and community (Becker, Reib, & Shaw, 2014). Frisch (2009) described these subscales of life quality as follows.

Health. Health is being physically fit, not sick, and without pain or disability. This scale asks participants to respond to prompts such as "Overall, I feel physically fit."

Self-esteem. Self-esteem is liking and respecting yourself in light of your strengths and weaknesses, successes and failures, and ability to handle problems. This scale includes prompts such as "I seek the approval of others constantly."

Goals and values. Goals and values are beliefs about what matters most in life and how you should live, both now and in the future. It can also include the purpose or meaning of life as a person sees it. It may or may not include spiritual beliefs. This scale includes prompts such as "I believe that life has meaning and purpose."

Money. The money scale concerns the money a person earns, the things a person owns, and beliefs that a person will have the money and things he or she needs in the future. This scale asks participants to respond to prompts such as "My standard of living is important to my overall happiness."

Work. The work scale concerns the career or how a person spends most of his or her time. Work includes duties on the job or the money a person earns (if any) or the people a person works with. It includes prompts such as "My job is a big component of my happiness."

Play. The play scale pertains to what a person does in his or her free time to relax, have fun, or improve him or herself. This can include watching movies, visiting friends, or pursuing a hoppy such as sports of gardening. This scale includes prompts such as "Self-improvement makes my life more satisfying."

Learning. The learning scale pertains to gaining new skills or information about things that interest a person. Learning can come from reading books or taking classes on subjects like history, care repair, or using a computer. This scale contains prompts such as "Learning new things is important to me."

Creativity. The creativity scale concerns using the imagination to come up with new and clever ways to solve every day problems or to pursue a hobby like painting, photography, or needlework. This can include decorating the home, playing guitar, or finding a new way to solve a problem at work. This scale includes prompts such as "I create better works when I am in a positive mood."

Helping. The helping scale means helping others (not just friends or relatives) in need or helping to make your community a better place to live. Helping means helping people who are not your friends or relatives and can include volunteer work or giving money to a good cause. It includes prompts such as "I donate money to charity."

Love. The love scale involves a close romantic relationship with another person. It includes sexual feelings and feeling loved, cared for, and understood. Love usually includes sexual feelings and feeling loved, cared for, and understood. This scale includes prompts such as "I am very open and honest with my significant other."

Friends. The friends scale pertains to people (not relatives) a person knows well and cares about who have interests and opinions like his or hers. Friends have fun together, talk about personal problems, and help each other out. It includes prompts such as "I put a lot of effort into maintaining my friendship."

Children. The children scale includes a measure of how a person gets along with his or her child. This scale asks participants to think about how they get along as they care for, visit, or play with their child. It includes prompts such as "My children's happiness is more important than my own."

Relatives. The relative scale pertains to how a person gets along with his or her parents, grandparents, brothers, sisters, aunts, uncles, and in-laws. This scale questions participants on how they get along when they are doing things together like visiting, talking on the telephone, or helping each other out. It includes prompts such as "Family is very important to me."

Home. The home scale pertains to where a person lives. It is a house or apartment where a person lives. It pertains to how nice it looks, how big it is, and the rent or house payment. This scale includes prompts such as "I am extremely happy with my living situation."

Neighborhood. The neighborhood scale pertains to the area around the participant. It asks the participant to consider how nice it looks, the amount of crime in the area, and how well he or she likes the people. The neighborhood scale includes prompts such as "I am happy with my current neighborhood."

Community. The community scale pertains to the whole city, town, or rural area where a person lives. Community includes how nice the area looks, the amount of crime, and how well the participant likes the people in the area. The participant is also asked to consider the cost of necessities, the availability of jobs, the government, schools, taxes, and pollution. This scale includes prompts such as "I am happy with the current state of my community."

Oswestry Disability Index. The second measure of interest is that rating of disability; more specifically, I examined the difference in this from between pre to postintervention. This construct was operationalized through the administration of the Oswestry Disability Index. This variable was used to measure the extent to which participants felt they were disabled and was collected both before and after participation in the program. The difference in these two scores was used to measure the amount of success that participants felt the program had in remediating their disability, or the increase or decrease in their perceived disability. Fairbank, Couper, and Davies (1980) first published the Oswestry lower back pain questionnaire. After publishing a revised version in 1990, it has been widely used to measure pain-related functional outcomes, and it has become the gold standard of pain-related functional outcome tools (Fairbank & Pynsent, 2000). The Oswestry Disability Index is in public domain and is easily accessible by a simple Internet search. Fairbank and Pynsent (2000) also indicated that the Cronbach's alpha reliability of this instrument ranges from .71 (i.e., acceptable) to .87 (i.e., good). Thus, it has shown consistent reliability and validity and was appropriate for use in the study.

The final variable in the analyses was whether a participant was a workers' compensation patient. This information was collected as demographic information during the data collection for each individual and was stored along with the prior measures such that I could group a participant into the workers' compensation or nonworkers' compensation group for use in testing hypothesis two. Because data were already collected, it was not necessary to acquire secondary permission from the anonymous individuals.

Data Analysis Plan

I entered data into SPSS version 22.0 for Windows. Descriptive statistics were conducted to describe the sample demographics (workers' compensation status) and the research variables used in the analysis. Frequencies and percentages were calculated for nominal data, such as workers' compensation status. Means and standard deviations were calculated for continuous data, such as quality of life scores and disability rating both before and after participation in the program (Howell, 2010).

Prior to analysis, data were screened for accuracy, missing data, and outliers or extreme cases. Descriptive statistics and frequency distributions were conducted to determine if responses were within the possible range of values and that the data were not distorted by outliers. The presence of outliers was tested by the examination of standardized values. Standardized values were created for either subscale score, and cases were examined for values that fell above 3.29 and values that fell below -3.29; Tabachnick and Fidell (2012) used this cutoff point to determine outliers. Any participants with outlying variables were removed from the data set. Cases with missing data were examined for nonrandom patterns. Participants who did not complete major sections of the survey instruments were excluded from analysis.

Research Questions and Hypotheses

1. Does a patient's overall perceived quality of life after an injury affect his or her perceived success in an IPMP program, as measured by his or her self-reported change in disability?

$H_0$1**:** A patient's overall perceived quality of life before participation in an IPMP is not a statistically significant predictor of his or her change in disability status from before participation to after his or her participation in an IPMP.

H_a1**:** A patient's overall perceived quality of life before participation in an IPMP is a statistically significant predictor of his or her change in disability status from before participation to after his or her participation in an IPMP.

In order to assess Research Question 1, and to determine the degree to which postinjury quality of life scores predict the success of an IPMP, a simple linear regression and multiple linear regression analysis were conducted. A simple linear regression is an appropriate analysis when the goal of the research is to assess the extent of a relationship between an interval or ratio level predictor variable on an interval or ratio level criterion variable. A linear regression uses the following regression equation: $y = b1*x + c$; where y = estimated dependent, c = constant, b = regression coefficients, and x = IV (Tabachnick & Fidell, 2012).

The simple linear regression assessed if the IV (quality of life score) predicted the DV (change in disability status) by way of the *F* test. R^2 was reported and used to determine how much variance in the DV could be accounted for by the IV. The *t* test was used to determine the significance of the predictor and if the predictor variable was a significant predictor, the beta coefficient was used to determine the extent of prediction from the IV. For any significant predictors, every one unit increase in quality of life scores, and the difference in disability increased or decreased by the number of unstandardized beta coefficients (Morgan, Leech, Gloekner, & Barrentt, 2007).

2. Which of the 16 scales of Quality of Life Index significantly and uniquely predict success in an IPMP program?

$H_{01}2$**:** There is no statistically significant relationship between health-related quality of life and success in an IPMP program.

$H_{a1}2$**:** There is a statistically significant relationship between health-related quality of life and success in an IPMP program.

H_{02}2: There is no statistically significant relationship between self-esteem related quality of life and success in an IPMP program.

H_{a2}2: There is a statistically significant relationship between self-esteem related quality of life and success in an IPMP program.

H_{03}2**:** There is no statistically significant relationship between goal and value related quality of life and success in an IPMP program.

H_{a3}2**:** There is a statistically significant relationship between goal and value related quality of life and success in an IPMP program.

H_{04}2**:** There is no statistically significant relationship between money related quality of life and success in an IPMP program.

H_{a4}2**:** There is a statistically significant relationship between money related quality of life and success in an IPMP program.

H_{05}2**:** There is no statistically significant relationship between work related quality of life and success in an IPMP program.

H_{a5}2**:** There is a statistically significant relationship between work related quality of life and success in an IPMP program.

H_{06}2**:** There is no statistically significant relationship between play related quality of life and success in an IPMP program.

H_{a6}2**:** There is a statistically significant relationship between play related quality of life and success in an IPMP program.

H_{07}2**:** There is no statistically significant relationship between learning related quality of life and success in an IPMP program.

$H_{a7}2$**:** There is a statistically significant relationship between learning related quality of life and success in an IPMP program.

$H_{08}2$**:** There is no statistically significant relationship between creativity related quality of life and success in an IPMP program.

$H_{a8}2$**:** There is a statistically significant relationship between creativity related quality of life and success in an IPMP program.

$H_{09}2$**:** There is no statistically significant relationship between quality of life related to helping and success in an IPMP program.

$H_{a9}2$**:** There is a statistically significant relationship between quality of life related to helping and success in an IPMP program.

$H_{010}2$**:** There is no statistically significant relationship between love related quality of life and success in an IPMP program.

$H_{a10}2$**:** There is a statistically significant relationship between love related quality of life and success in an IPMP program.

$H_{011}2$: There is no statistically significant relationship between friend related quality of life and success in an IPMP program.

$H_{a11}2$**:** There is a statistically significant relationship between friend related quality of life and success in an IPMP program.

$H_{012}2$: There is no statistically significant relationship between children-related quality of life and success in an IPMP program.

$H_{a12}2$: There is a statistically significant relationship between children-related quality of life and success in an IPMP program.

$H_{013}2$: There is no statistically significant relationship between related quality of life regarding relatives and success in an IPMP program.

$H_{a13}2$: There is a statistically significant relationship between related quality of life regarding relatives and success in an IPMP program.

$H_{014}2$: There is no statistically significant relationship between home related quality of life and success in an IPMP program.

$H_{a14}2$: There is a statistically significant relationship between home related quality of life and success in an IPMP program.

$H_{015}2$: There is no statistically significant relationship between neighborhood related quality of life and success in an IPMP program.

$H_{a15}2$: There is a statistically significant relationship between neighborhood related quality of life and success in an IPMP program.

$H_{016}2$: There is no statistically significant relationship between community related quality of life and success in an IPMP program.

$H_{a16}2$: There is a statistically significant relationship between community related quality of life and success in an IPMP program.

A multiple linear regression was also assessed using all 16 individual measures of quality of life in order to inform Research Question 2. This regression was interpreted in the same fashion as the simple linear regression, with the addition of multiple *t* tests to assess each individual predictor.

Prior to analysis, the assumptions of a linear regression were assessed; these assumptions include normality and homoscedasticity. Normality assumes a normal distribution as it relates to the predictor variables versus the criterion variables, and homoscedasticity assumes that scores are normally distributed about the regression line. Both linearity and homoscedasticity were assessed by visual examination of scatter plots (Stevens, 2009). For the multiple linear regression to assess the 16 domains of quality of life, assumptions of normality and homoscedasticity were assessed in the same fashion; the assumption of an absence of multicollinearity were also assessed. The assumption of absence of multicollinearity requires that the IVs in the regression model are not too highly correlated. This assumption was assessed using variance inflation factors (VIFs). Any VIF over 10 indicates a variable which exhibits multicollinearity with one or more other independent variables. Variables which violate this assumption were either removed, or assimilated into the most closely related variable (Tabachnick & Fidell, 2012).

3. Is there a statistically significant difference in the perceived success in an IPMP program between patients who are part of a workers' compensation program and those who are not?

$H_0$3**:** There is no statistically significant difference in the change in perceived disability status before versus after participation in an IPMP in workers' compensation patients versus other patients.

H_a3: There is a statistically significant difference in the change in perceived disability status before versus after participation in an IPMP for workers' compensation patients versus other patients.

In order to assess Research Question 3, and to determine if any statistically significant differences exist in the degree of change in disability status after participation in the IPMP for workers’ compensation versus other patients, an independent sample *t* test was conducted. The independent sample t-test is the appropriate statistical analysis when the scope of a hypothesis is to assess if differences exist on a continuous DV (i.e., change in disability) by a dichotomous grouping IV (i.e., workers’ compensation versus other; Pagano, 2009).

Prior to analysis, the assumptions of normality and homogeneity of variance were assessed. Normality is the assumption that the DV over which differences were assessed is normally distributed over the sample. This assumption was assessed with a one sample Kolmogorov-Smirnov test; significant findings on this test indicate that the sample is significantly different from a normal distribution, and the assumption is violated. However, the *t* test is quite robust against violations of normality (Morgan et al., 2007). Homogeneity of variance assumes that both groups have equal error variances, and was assessed using Levene’s test. The *t*-test was two tailed, and used an alpha level, or the probability of rejecting the null hypothesis when it is true, set at $\alpha = 0.05$; this allowed 95% confidence that any significant differences did not occur by lone chance.

Threats to Validity

Several limitations were inherent within the scope of this quantitative study. Foremost, the use of a quantitative method is able to address the research questions and hypotheses, but is unable to adequately examine the depth and underlying perceptions and experiences, such as those related to the IPMP and how participants viewed their quality of life as it pertained to a successful outcome. Thus, this study traded this degree of richness within the results for a degree of statistical certainty that these associations did not occur by chance alone.

Further, the nonexperimental nature of the study subtracts from the desirable randomness which is a strength of the standard experimental study. However, because I could not choose to place participants into a workers' compensation group (i.e., they already classify as either workers compensation or do not), this issue could not be addressed; it was taken into account when interpreting the results. For this reason, and because participants were gathered through convenience sampling, the results may not be strictly generalized across all relevant situations.

Secondary data analysis allows the investigator to examine existing data and address research questions to bring forth new content or research questions. However, limitations to secondary analysis exist. Skewed interpretation of the data may occur in secondary data analysis as variables may have been controlled or altered. Secondary data may also be difficult to interpret in that in using large data files, it is difficult to ensure that statistical software packages do not influence validity of the research (Colorado State University, 2010).

In addition, subjects may have responded differently to the disability status assessment after participation in the program, simply because of the fact that they had taken the assessment previously, and were thus familiar with the instrument. Patients at Summit Pain Management Institute are admitted into the IPMP only once. The QOLI is given at the start of the IPMP and the Oswestry Disability Index is given at the beginning of the program and again at the end of the program, in order to calculate the change that each individual reports. This is the concept of repeated testing effects, and may present itself as a limitation any time that repeated measures are taken. However, this does not typically become an issue unless subjects are tested many times and become familiar with the instrument. If a participant has knowledge of the study, and their responses will be used for analysis, this knowledge may skew the participant's responses. Thus, the self-reporting nature of the survey may create bias where respondents did not answer truthfully to questions; this may cause validity issues regarding the instrument (Babbie, 2007). Participants who contributed to the archival data were only given each assessment once, and repeated testing effects were thus expected to be minimal at worst. All data were matched by an identifier variable, which was unique to each participant. Thus, participants were not repeated in the data.

Ethical Procedures

A researcher who conducts studies that involve human subjects has a responsibility to protect participants (Bloomberg & Volpe, 2012). In conducting this research study, I adhered to the ethical and moral guidelines prescribed by federal regulations and the Institution Review Board (IRB). The IRB approval number for this study was 07-07-15-0118216. I worked with data from human subjects during this study. I contacted the owner of Summit Pain Management Institute to gain written approval to access the data set (Appendix A) and IRB approval was sought before any data analysis. The data collection approach did not entail dissemination of a survey instrument, although the information collected from the proposed database was treated respectfully, and will not be made publicly available. Additionally, I did not use any identifiers in the presentation of results; it was important that anonymity was maintained throughout the course of the study. Although identifying items are available on the database, items such as names were not collected.

I may have worked at Summit Pain Management Institute during the time that some of the assessments were collected. However, at the time that the data were collected, I was not the assessment administrator. I did not personally conduct the surveys, collect or calculate the outcomes. At the time of initial collecting, participants were assured by the administering Summit Pain Management Institute staff that no identifying features would be included with the results.

Data Storage, Retention, and Destruction to Protect Confidentiality

That data in the study has already been collected for statistical analysis by Summit Pain Management Institute. Summit Pain Management Institute gives all of their patients various measures to fill out upon acceptance into the program as well as at the conclusion of the program. The patients were informed that this information would be used to demonstrate the efficacy of Summit Pain Management Institute's program. The data is collected by various staff members at Summit Pain Management Institute.

The use of archival data for this study was designed to minimize the need to contact individuals, disseminate consent forms, and collect identifiable data. In accord with IRB and federal guidelines, I will safeguard all data and information in order to protect confidentiality. The safeguard measure for data storage is a locked file in the researcher's residence where the data will be retained securely for a period of five years after the research is complete. Upon expiration of the 5-year retention period, I will permanently destroy all research related data and information pertaining to this study in the researcher's possession.

Summary

The previous chapter outlined the proposed quantitative design, as well as the rationale for the use of this research model. In addition, a population and subsequent sample were delineated and procedures for the gathering of participant responses were specified as following a convenience sampling method. The chapter also operationalized the variables which were used to measure perceived quality of life and rating of disability, and included the instrumentation and procedures for archival data collection. The treatment of such data, and statistical procedures to be used in addressing the hypotheses were also explained, and included a rationale for such analyses and elucidated the presentation of results. Finally, limitations and ethical concerns were addressed, with special consideration of the potential methods which may remedy these difficulties or harms. I will adhere strictly to these procedures in gathering and analyzing data in order to cleanly and efficiently address the research problem at hand. Chapter 4 provides statistical outcomes, as well as rejection or acceptance of the null hypotheses as outlined in the proposed analyses.

Chapter 4: Results

The purpose of this quantitative causal comparative study was to explore whether a patient's perceived quality of life after injury but prior to treatment will affect his or her success in an IPMP. The IV was the patients' perceived quality of life after injury but prior to treatment, as measured by the QOLI. The DV was a patient's change in disability status, as measured from the Oswestry Disability Index. This assessment was administered to participants both before and after completion of an IPMP; as such, the difference between pre-IPMP scores and post-IPMP scores represented the change in their disability status. The effect of quality of life on this change in disability was assessed using linear regression analysis. The change in disability status was also assessed between workers' compensation patients and other patients through the use of a *t*-test analysis.

In the following chapter, I discuss the data collection process and subsequent data analysis. I present demographic data and descriptive statistics of relevant variables before detailed analyses of the research questions and coordinating hypotheses.

Data Collection

Participants for this study were gathered using archival data from the Summit Pain Management Institute from the years 2011-2013. Data collection took approximately 2 weeks. As all data were archival, no participants were contacted directly. Recruitment and response rates were not an issue as all data were already gathered by the Summit Pain Management Institute staff. Only participants who had finished the IPMP were used in the study because the study required an Oswestry Disability Index score at the beginning and end of the IPMP.

To gather participants from this population, a convenience sampling strategy was employed. Using a convenience sampling strategy, I gained access to Summit Pain Management Institute program historical data. I contacted the owner of the Summit Pain Management Institute to gain written approval to access the data set (Appendix A). Matched records were gathered for QOLI (gathered before the program) and the Oswestry Disability Index, which was taken at two points in time (i.e., both before the program and after the program). No demographic information was collected from the archival source, with the exception of participants' status as a workers' compensation patient or not. There were no discrepancies in the data collection from the original plan.

Several limitations were inherent within the scope of this quantitative study. Foremost, the use of a quantitative method is able to address the research questions and hypotheses, but is unable to adequately examine the depth and underlying perceptions and experiences, such as those related to the IPMP and how participants viewed their quality of life as it pertained to a successful outcome. Thus, I traded this degree of richness within the results for a degree of statistical certainty that these associations did not occur by chance alone.

Further, the nonexperimental nature of the study means that stay was not random, which is a strength of the standard experimental study. However, because I could not choose to place participants into a workers' compensation versus other group (i.e., they already fell into one or the other), this issue could not be addressed; it will be taken into account when interpreting the results. For this reason, and because participants were gathered through convenience sampling, the results may not be generalized across all relevant situations.

Secondary data analysis allows the investigator to examine existing data and to address research questions to bring forth new content or research questions. However, limitations to secondary analysis exist. Skewed interpretation of the data may occur in secondary data analysis as variables may have been controlled or altered. Secondary data may also be difficult to interpret in that, in using large data files, it is difficult to ensure that statistical software packages do not influence validity of the research (Colorado State University, 2010).

The data were assessed for accuracy, missing cases, and univariate outliers. There were no participants who had not completed most of the survey nor did the missing cases show nonrandom patterns. Descriptive statistics and frequency distributions were conducted to determine that responses were within the possible range of values and that the data were not distorted by outliers. Outliers were assessed by checking the standardized scores as greater than 3.29 or less than 3.29 (Tabachnick & Fidell, 2012). There were no outliers found for overall QOLI and Oswestry Disability Index scores, so the full set of 137 participants was used.

Results

Descriptive Statistics

Of the 137 participants, 56% received workers' compensation (n = 77) and 44% did not receive workers' compensation (n = 60). Most of the participants identified with a very low quality of life (82, 60%). Only six (4%) participants identified with a high quality of life. Frequencies and percentages are presented in Table 1.

Table 1

Frequencies and Percentages of Demographics

Demographic	*n*	%
Workers' Compensation Status		
Nonworkers' Compensation	60	44
Workers' Compensation	77	56
Quality of Life Inventory (based on T scores)		
Very Low	82	60
Low	17	17
Average	32	23
High	6	4

Note. Due to rounding error, not all percentages may sum to 100.

The difference in Oswestry Disability Index scores from pre- to post-IPMP ranged from -2.16 to 1.47 with a mean of -0.61 and a standard deviation of 0.68. Overall QOLI scores ranged from -4.25 to 4.75 with a mean of 0.29 and a standard deviation of 1.92. The highest scores for QOLI were measured to be children-related quality of life (M = 2.65, SD = 3.61), neighborhood quality of life (M = 2.15, SD = 2.40), and relatives quality of life (M = 2.09, SD = 2.91). The lowest scores included health quality of life (M = -3.26, SD = 3.17), play quality of life (M = -1.88, SD = 3.17), and work quality of life (M = -1.80, SD = 3.25). The descriptive statistics of the continuous variables are presented in Table 2.

Table 2

Descriptive Statistics of Continuous Variables

Continuous Variables	*Min.*	*Max.*	*M*	*SD*
Oswestry Difference	-2.16	1.47	-0.61	0.68
Pre-IPMP Oswestry	1.00	5.00	2.93	0.89
Post-IPMP Oswestry	0.40	4.80	2.32	0.90
Overall Quality of Life	-4.25	4.75	0.29	1.92
Health Quality of Life Score	-6.00	6.00	-3.26	3.17
Self-Esteem Quality of Life Score	-6.00	6.00	-0.48	3.93
Goals and Values Quality of Life Score	-6.00	6.00	-0.44	3.97
Money Quality of Life Score	-6.00	6.00	-1.02	2.85
Work Quality of Life Score	-6.00	6.00	-1.80	3.25
Play Quality of Life Score	-6.00	6.00	-1.88	3.17
Learning Quality of Life Score	-6.00	6.00	0.11	3.08
Creativity Quality of Life Score	-6.00	6.00	-0.31	3.14
Helping Quality of Life Score	-6.00	6.00	0.21	3.29
Love Quality of Life Score	-6.00	6.00	1.25	4.48
Friends Quality of Life Score	-6.00	6.00	1.78	3.15
Children Quality of Life Score	-6.00	6.00	2.65	3.61
Relatives Quality of Life Score	-6.00	6.00	2.09	2.91
Home Quality of Life Score	-6.00	6.00	1.91	3.75
Neighborhood Quality of Life Score	-4.00	6.00	2.15	2.40
Community Quality of Life Score	-6.00	6.00	1.73	2.27

Detailed Analysis

Research Question 1

1. Does a patient's overall perceived quality of life after an injury affect his or her perceived success in an IPMP program, as measured by his or her self-reported change in disability?

H_01: A patient's overall perceived quality of life before participation in an IPMP is not a statistically significant predictor of his or her change in disability status from before participation to after his or her participation in an IPMP.

H_a1: A patient's overall perceived quality of life before participation in an IPMP is a statistically significant predictor of his or her change in disability status from before participation to after his or her participation in an IPMP.

To assess Research Question 1, I used a simple linear regression with Oswestry Disability Index score difference to measure change in disability status as the DV and overall quality of life as the IV. Prior to conducting the analysis, the assumptions of normality and homoscedasticity were assessed. Normality means that the data set follows a normal, bell-shaped distribution. This assumption is checked with a normal P-P plot. If the assumption is met, the data points follow the straight line on the plot. As Figure 1 shows, the assumption of normality was met. The assumption of homoscedasticity, or equal variance of the error terms, was assessed with a scatter plot of the regression standardized residuals as a function of the standardized predicted values. For the assumption to be met, the points must follow a rectangular distribution about zero. Figure 2 shows that the residuals follow this pattern, so the assumption of homoscedasticity was met.

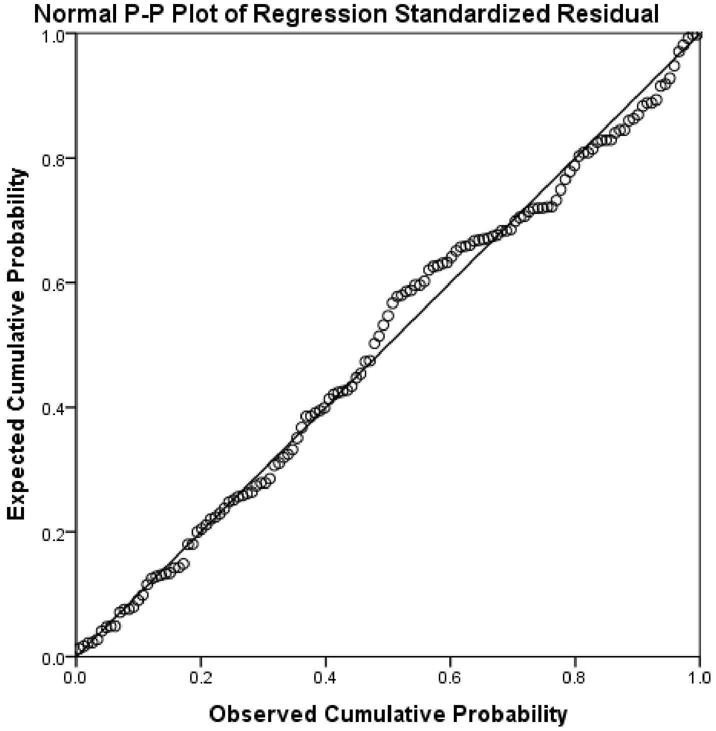

Figure 1. Normal P-P plot for simple linear regression

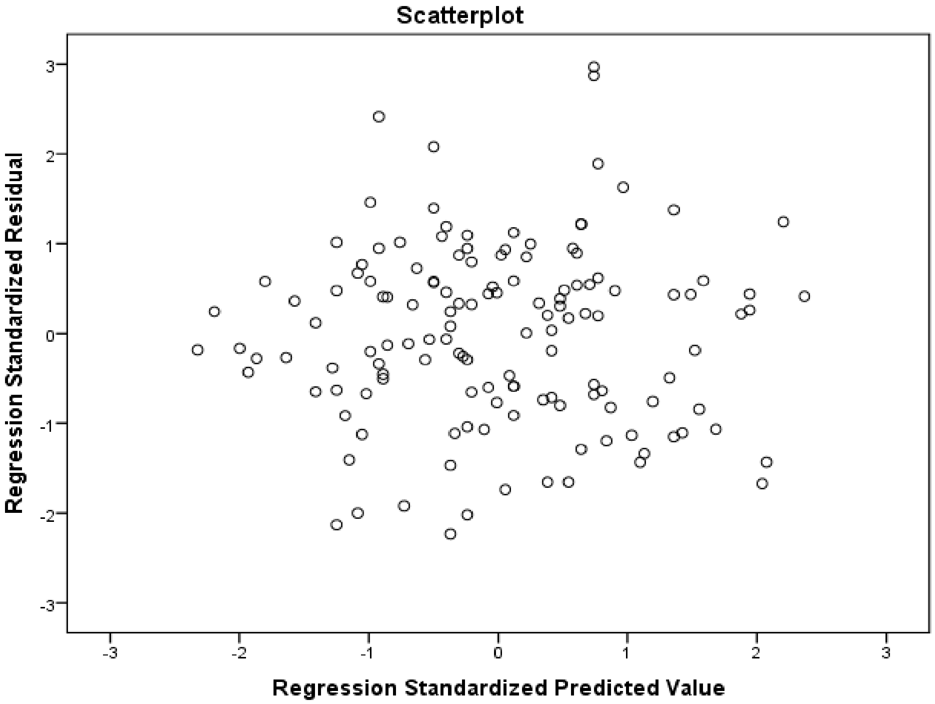

Figure 2. Scatterplot of standardized residuals as a function of standardized predicted values

Because the assumptions were met, the simple linear regression was conducted. According to the results of the regression, there was not a statistically significant relationship between perceived quality of life and change in disability status, $F(1,135) = 1.32$, $p = .252$, $R^2 = .01$. Thus, the null hypothesis, stating a patient's overall perceived quality of life before participation in an IPMP is not a statistically significant predictor of his or her change in disability status from before participation to after his or her participation in an IPMP, is retained. Results of the simple linear regression are presented in Table 3.

Table 3

Results for Simple Linear Regression with QOLI Predicting Oswestry Disability Index Difference

Source	*B*	*SE*	β	*t*	*p*	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Overall Quality of Life	-0.04	0.03	-0.10	-1.15	.252	-0.10	0.03

Note. $F(1,135) = 1.32$, $p = .252$, $R^2 = .01$

2. Which of the 16 scales of QOLI significantly and uniquely predict success in an IPMP program?

$H_{01}2$**:** There is no statistically significant relationship between health-related quality of life and success in an IPMP program.

$H_{a1}2$**:** There is a statistically significant relationship between health-related quality of life and success in an IPMP program.

$H_{02}2$: There is no statistically significant relationship between self-esteem related quality of life and success in an IPMP program.

$H_{a2}2$: There is a statistically significant relationship between self-esteem related quality of life and success in an IPMP program.

$H_{03}2$**:** There is no statistically significant relationship between goal and value related quality of life and success in an IPMP program.

$H_{a3}2$**:** There is a statistically significant relationship between goal and value related quality of life and success in an IPMP program.

$H_{04}2$**:** There is no statistically significant relationship between money related quality of life and success in an IPMP program.

$H_{a4}2$**:** There is a statistically significant relationship between money related quality of life and success in an IPMP program.

$H_{05}2$**:** There is no statistically significant relationship between work related quality of life and success in an IPMP program.

$H_{a5}2$**:** There is a statistically significant relationship between work related quality of life and success in an IPMP program.

$H_{06}2$**:** There is no statistically significant relationship between play related quality of life and success in an IPMP program.

$H_{a6}2$**:** There is a statistically significant relationship between play related quality of life and success in an IPMP program.

$H_{07}2$**:** There is no statistically significant relationship between learning related quality of life and success in an IPMP program.

$H_{a7}2$**:** There is a statistically significant relationship between learning related quality of life and success in an IPMP program.

$H_{08}2$**:** There is no statistically significant relationship between creativity related quality of life and success in an IPMP program.

$H_{a8}2$**:** There is a statistically significant relationship between creativity related quality of life and success in an IPMP program.

$H_{09}2$**:** There is no statistically significant relationship between quality of life related to helping and success in an IPMP program.

$H_{a9}2$**:** There is a statistically significant relationship between quality of life related to helping and success in an IPMP program.

$H_{010}2$**:** There is no statistically significant relationship between love related quality of life and success in an IPMP program.

$H_{a10}2$**:** There is a statistically significant relationship between love related quality of life and success in an IPMP program.

$H_{011}2$: There is no statistically significant relationship between friend related quality of life and success in an IPMP program.

$H_{a11}2$**:** There is a statistically significant relationship between friend related quality of life and success in an IPMP program.

$H_{012}2$: There is no statistically significant relationship between children-related quality of life and success in an IPMP program.

$H_{a12}2$: There is a statistically significant relationship between children-related quality of life and success in an IPMP program.

$H_{013}2$: There is no statistically significant relationship between related quality of life regarding relatives and success in an IPMP program.

$H_{a13}2$: There is a statistically significant relationship between related quality of life regarding relatives and success in an IPMP program.

$H_{014}2$: There is no statistically significant relationship between home related quality of life and success in an IPMP program.

$H_{a14}2$: There is a statistically significant relationship between home related quality of life and success in an IPMP program.

$H_{015}2$: There is no statistically significant relationship between neighborhood related quality of life and success in an IPMP program.

$H_{a15}2$: There is a statistically significant relationship between neighborhood related quality of life and success in an IPMP program.

$H_{016}2$: There is no statistically significant relationship between community related quality of life and success in an IPMP program.

$H_{a16}2$: There is a statistically significant relationship between community related quality of life and success in an IPMP program.

For Research Question 2 and the 16 pairs of the hypotheses, I conducted a multiple linear regression. Before conducting the analysis, the assumptions of normality, homoscedasticity, and absence of multicollinearity were assessed. Normality was assessed with a normal P-P plot. If the assumption is met, the data points do not deviate greatly from the line. The assumption was met, as shown in Figure 3. The assumption of homoscedasticity, or equal variance of the error terms, was assessed with a scatter plot of the regression standardized residuals as a function of the standardized predicted values. For the assumption to be met, the points must follow a rectangular distribution about zero. Figure 4 shows that the residuals follow this pattern, so the assumption of homoscedasticity was met. The assumption of absence of multicollinearity means that none of the independents variables are highly correlated with each other. The assumption was assessed with Variance Inflation Factors (VIFs). VIF values greater than 10 suggest the presence of multicollinearity and a violation of this assumption (Stevens, 2009). None of the predictor variables showed any signs of multicollinearity with the highest VIF value being 2.71; thus, the assumption was met.

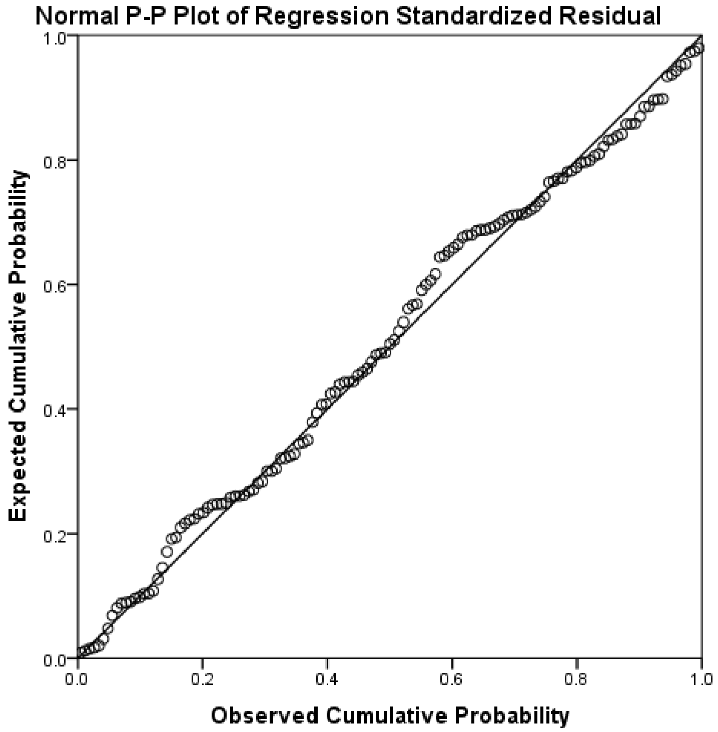

Figure 3. Normal P-P plot for multiple linear regression

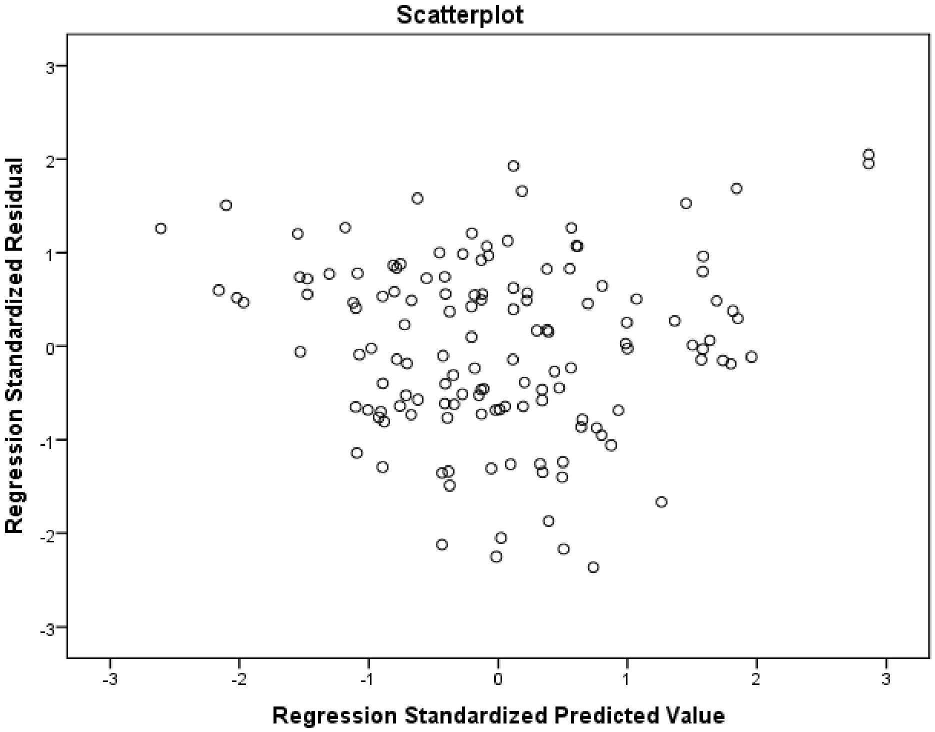

Figure 4. Scatterplot of standardized residuals as a function of standardized predicted values

As the assumptions were met, the multiple linear regression was conducted with the 16 subscores of the QOLI to predict change in disability status as measured by the difference in Oswestry Disability Index scores pre- and post-IPMP. The results of the regression indicated that there was not a significant relationship between QOLI subscores and Oswestry Disability Index difference, $F(16,120) = 1.03$, $p = .436$, $R^2 = 0.12$. Furthermore, none of the individual predictors were found to be significant so none of the null hypotheses could be rejected. The results of the multiple linear regression are presented in Table 4.

Table 4

Results for Multiple Linear Regression with QOLI Subscores Predicting Oswestry Disability Index Difference

						95% C.I.	
Source	*B*	*SE*	β	*t*	*p*	Lower Bound	Upper Bound
Health Quality of Life Score	-0.01	0.02	-0.06	-0.57	.569	-0.06	0.03
Self-Esteem Quality of Life Score	0.02	0.02	0.11	0.84	.405	-0.03	0.07
Goals and Values Quality of Life Score	-0.01	0.02	-0.07	-0.51	.612	-0.06	0.04
Money Quality of Life Score	0.00	0.03	-0.01	-0.07	.941	-0.06	0.05
Work Quality of Life Score	-0.03	0.03	-0.13	-1.10	.247	-0.08	0.02
Play Quality of Life Score	-0.02	0.03	-0.11	-0.89	.373	-0.07	0.03
Learning Quality of Life Score	-0.03	0.03	-0.14	-1.01	.316	-0.09	0.03
Creativity Quality of Life Score	0.02	0.03	0.09	0.73	.468	-0.03	0.07
Helping Quality of Life Score	0.04	0.02	0.21	1.84	.068	0.00	0.09
Love Quality of Life Score	0.01	0.02	0.03	0.32	.750	-0.03	0.04
Friends Quality of Life Score	-0.02	0.02	-0.09	-0.88	.383	-0.06	0.03
Children Quality of Life Score	0.00	0.02	-0.02	-0.21	.832	-0.04	0.03
Relatives Quality of Life Score	0.01	0.03	0.04	0.34	.735	-0.04	0.06
Home Quality of Life Score	-0.01	0.02	-0.03	-0.26	.796	-0.05	0.04
Neighborhood Quality of Life Score	0.05	0.03	0.18	1.57	.120	-0.01	0.12
Community Quality of Life Score	-0.05	0.04	-0.18	-1.49	.138	-0.12	0.02

Note. $F(16,120) = 1.03$, $p = .436$, $R^2 = 0.12$

3. Is there a statistically significant difference in the perceived success in an IPMP program between patients who are part of a workers' compensation program and those who are not?

$H_0 3$**:** There is no statistically significant difference in the change in perceived disability status before versus after participation in an IPMP in workers' compensation patients versus other patients.

$H_a 3$: There is a statistically significant difference in the change in perceived disability status before versus after participation in an IPMP for workers' compensation patients versus other patients.

In order to assess Research Question 3, I conducted an independent sample t test. Before the analysis, the assumptions of normality and homogeneity were assessed with the Kolmogorov-Smirnov (K-S) test and the Levene's test for Equality of Variances, respectively. The K-S test has the null hypothesis that the sample distribution fits the normal distribution; as the K-S test indicated insignificance ($p = .088$) the assumption of normality was met. The Levene's test has the null hypothesis that the error terms have equal variances. The results of the Levene's test indicate insignificance ($p = .898$) so the assumption of homogeneity was met as well.

As the assumptions were met, the *t* test was conducted to determine if there were significant differences in means of the Oswestry Disability Index score difference between participants who receive workers' compensation and those who did not. The results of the analysis indicate insignificance ($t(135) = 0.53$, $p = .599$). Thus the null hypothesis that there is not a statistically significant difference in the change in perceived disability status between workers' compensation patients versus other patients must be retained. The results of the independent sample *t* test are presented in Table 5.

Table 5

Test Statistics for Examining the Differences in Oswestry Change Scores Between Workers-Compensation and Nonworkers' Compensation Participants

	Nonworkers' Compensation		Workers' Compensation			
Variable	*M*	*SD*	*M*	*SD*	*t*(135)	*p*
Oswestry Difference	-0.57	0.68	-0.63	0.69	0.53	.599

Summary

In the preceding chapter, the research questions and associated hypotheses were assessed. Research Question 1 was assessed with a simple linear regression that indicated insignificance so the null hypothesis $H_0 1$ was retained. Research Question 2 and 16 hypotheses pairs were assessed with a multiple linear regression that suggested that all 16 null hypotheses could not be rejected. Research Question 3 was assessed with an independent sample t test, which also indicated insignificance such that the final null hypothesis was maintained. These results will be discussed in the context of the existing body of knowledge and literature in Chapter 5.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

Chronic pain is a growing problem in the United States, with impacts far reaching beyond the individual (Laisne et al., 2012). While the reasons for chronic pain remain unclear, researchers are addressing pain as a complex phenomenon involving physiological, cultural, social, emotional, and psychological factors (Gatchel et al., 2014). This approach, called the biopsychosocial model of pain, uses treatment options, known as IPMPs, which involve interdisciplinary care that integrates physical treatment with emotional, environmental, behavioral, and cognitive interventions (Gatchel et al., 2014). Despite literature documenting the effectiveness of IPMPs (Gatchel et al., 2014; McGeary et al., 2012; Rogerson et al., 2010), patients often find it difficult to obtain authorization for these programs from third party insurance payers (Gatchel et al., 2014) who often do not understand the long-term benefits of IPMPs, both in terms of cost and in terms of patients' results (Gatchel & Okifuji, 2006). Part of the reason for this problem is the lack of appropriate and consistently applied screening tools to determine which patients will benefit the most from this type of treatment (Gatchel & Okifuji, 2006).

The IV in this study was the perceived quality of life after injury but prior to treatment, as measured by the QOLI. The DV was the patients' perceived change in disability, as measured by the difference in Oswestry Disability Index scores from before participation in the IPMP to after. The selection of participants was drawn from chronic pain patients who had participated in a functional restoration program at the Summit Pain

Management Institute located in Northern California. The purpose of this study was to explore whether a patient's perceived quality of life after injury but prior to treatment would affect his or her success in an IPMP. The goal of this study was to expand the current knowledge base regarding which patients would most benefit from treatment using an IPMP.

According to study findings, quality of life, as measured by the QOLI, cannot be used as a prediction factor for success in an IPMP. As I found that none of the 16 scales of the QOLI were statistically significant in predicting success in an IPMP. I also examined if there was a statistically significant difference in the perceived success in an IPMP program between patients who were part of a workers' compensation program and those who were not. I did not find a significant difference between workers' compensation patients and those who had other forms of insurance.

Interpretation of the Findings

In this study, quality of life was assessed using the QOLI. The QOLI uses 16 scales (health, self-esteem, goals and values, money, work, play, learning, creativity, helping, love, friends, children, relatives, home, neighborhood, and community) that contribute to one overall quality of life score. Patient success was determined by measuring the difference between pre-IPMP and post-IPMP Oswestry Disability Index scores. I examined each scale individually as well as the overall QOLI score. Neither quality of life as an overall score, nor any of the 16 scales seemed to predict success in an IPMP. Success in an IPMP may be independent of initial quality of life factors. Incidentally, I found a statistically significant difference between pre-IPMP and post-

IPMP Oswestry Disability Index scores, which suggests that the IPMP did make a difference in the patients' view of their degree of disability. This finding further supports previous research which indicates that IPMPs are effective and offer the best clinical care for chronic pain sufferers (Gatchel et al., 2014; McGeary et al., 2012; Rogerson et al., 2010).

Biopsychosocial models of pain emphasize the multidimensional nature of pain experiences and the dynamic interaction among physiological, psychological, and social factors (Gatchel et al., 2014). When interpreting these results through the lens of the biopsychosocial model of pain, it is important to note that while quality of life as measured by the QOLI seemed not to make a difference in predicting patient success, this does not mean that quality of life factors are not important in the treatment of chronic pain. In this study, I looked at whether QOLI scores could be used to predict success not whether quality of life as a construct was important to patient success. This study, while not confirming the use of QOLI scores as a predictive factor for success, does support the use of the biopsychosocial model for the treatment of pain as a successful intervention method.

Positive psychology was another theoretical framework for this study. Positive psychology is concerned with how positive subjective experience and positive individual traits such as hope and optimism will impact and protect individuals from pathologies and poor quality of life (Ong el at., 2010; Seligman & Csikszentmihalyi, 2000). The premise of positive psychology still holds true in this study; a more positive life can influence how people conceptualize, experience, and cope with chronic pain. However, when viewing the hypotheses for this study from a different angle, acceptance of the alternative hypotheses could have implied that to be successful in an IPMP, a person has to have a good quality of life before treatment. Again, I sought to show that quality of life could be used as a predictive factor when determining who would be successful in an IPMP. Consistent with previous research that chronic pain patients report lower qualities of life (Clark, 2005), the patients in this study reported low initial QOLI scores. However, I could have inadvertently put chronic pain patients at a disadvantage when seeking treatment by placing the unrealistic expectation that their quality of life before treatment should be good. While I did not demonstrate that QOLI scores could predict success in an IPMP, I did show that, despite an initially poor quality of life, improvement could happen. Looked at from another perspective, a person does not have to express hope and optimism when first confronted with the diagnosis of cancer to see results from treatment. The treatment itself is meant to provide medical, psychological, and social support. Positive psychologists might speculate that though participating in the IPMP, patients increased their hope and optimism about the future and therefore decreased their perceived disability.

I also looked at insurance status (i.e., workers' compensation or other) as a factor in perceived success in an IPMP. According to study results, there was not a significant difference in the two categories of insurance. This finding may give hope to individuals who are in the workers' compensation system awaiting authorization for treatment. Insurance status was not a determining factor in success, and despite delays in authorization, patients still found improvement once the treatment was provided.

Limitation of the Study

A limitation of this study was the fact that I focused on California-specific guidelines. The generalizability of the findings to states with alternate medical use schedules, guidelines, or relationships between third party insurance payers and chronic pain patients may not be possible. As well, the generalizability of this study is reduced by its nonexperimental design.

This study inherently lacked objective information regarding the patients' actual pain level and actual degree of disability. However, because I was concerned with the patients' perceptions of their quality of life and degree of disability, the lack of objective information regarding these factors was not an issue. However, the quantitative method used prevented in-depth analysis of the patients' perceptions; therefore, I traded this degree of richness within the results for a degree of statistical certainty. This limitation was partially overcome by using the QOLI, which asks each patient the same questions in each category. This format reduced confusion as to what was meant by quality of life in each of the 16 scales; however, it did not take away the limitation of patient interpretation of each scale.

A final limitation of this study was its use of secondary data. Because I did not administer the assessments to the participants, I cannot guarantee that all participants received the same instructions or that all participants completed the assessments as advised. Skewed interpretation of these data may have occurred if unknown variables were controlled or altered.

Recommendations

I indicated that QOLI scores were not predictive of success in an IPMP. Further research using different quality of life measures should be conducted to determine if these findings can be replicated. The addition of a second QOLI at the end of the program would also help determine if the IPMP was affecting change in the individual's view of his or her quality of life as well as his or her perceived disability or just his or her disability. A significant link exists between catastrophizing pain and how individuals experience chronic pain (Ong et al., 2010). Perhaps individuals are less likely to catastrophize pain after participating in an IPMP, thus reducing the experience of pain and perceived disability. Further research is needed to explore this idea but the addition of a second QOLI at the end of the IPMP may help to confirm this hypothesis. For this research question, the subjective nature of quality of life as a construct may have been too general a term. Further research into specific areas of quality of life might be more helpful in delineating which aspects of quality of life are most predictive of success.

Because I found that none of the 16 scales of the QOLI were statistically significant in predicting success in an IPMP, it should be considered whether physiological factors would be more effective in predicting success. It could be that the pain itself is a better predictor of success rather than psychological or social factors. The duration of pain, the type of pain, and whether the patient has had surgery all are factors that should be considered for future research. The primary problem for this study was the lack of appropriate screening tools to determine who would most benefit from an IPMP. While this study has added to the knowledge base of what screening tools should not be used, more research needs to be done to determine what screening tool should be used.

Finally, additional research into the make-up of IPMPs needs to be conducted. It is difficult to make generalizations about the efficacy of IPMPs when there is no standardization between programs. It could be that the quality of the IPMP itself is more predictive of success than any other psychological, social, or physiological factor. Additional research in this area might also assist third party insurance payers in knowing which IPMPs are going to provide the most benefit for patients. It will assist patients in making more informed decisions about which IPMP will best fit their needs.

Implications

The goal of this study was to positively impact social change by helping chronic pain sufferers' access care, thereby reducing patient suffering and cost to the U. S. economy. While I was not able to reject any of the null hypotheses, it still contributes to the knowledge gap regarding appropriate screening tools for admittance into an IPMP. This study demonstrates that quality of life does not necessarily determine success in an IPMP. This finding may give hope to individuals who feel they have a poor quality of life and think that things cannot get better. For the insurance carrier, this study adds to the knowledge base regarding what criteria should be used (and should not be used) to determine who would most benefit from an IPMP. This study also adds to the growing research on IPMPs as the most effective form of treatment for chronic pain (Gatchel et al., 2014; McGeary et al., 2012; Rogerson et al., 2010).

Implications for social change include third party payers changing the criteria for admittance into an IPMP. I found that QOLI scores do not predict success in an IPMP.

Therefore, a patients' quality of life before IPMP treatment should not be a factor when determining who should be approved for this type of treatment.

Conclusion

Chronic pain is a growing problem in the United States with nearly 50% of adults reporting some form of chronic health condition (CDC, 2010). The costs of chronic pain are immense with impacts being felt in the U.S. economy, the medical system, and in the patient's home (Dopson, 2010; Gannon et al., 2013; Laisne et al., 2012). While the causes of chronic pain are not well understood, the treatment of chronic pain has progressed from a disease model to a biopsychosocial model (Gatchel et al., 2014). This shift in focus allows practitioners to look at pain, not only as the body's response to tissue damage, but also as a complex interaction between social, psychological, and physiological factors. Though Wahl et al. found no direct relationship between quality of life and chronic pain, researchers have demonstrated a connection between quality of life, mental state, and the experience of chronic pain (Borsbo et al., 2010; Ong et al., 2010). In this study, I examined whether QOLI scores could be used to predict success in an IPMP. I also looked at whether any of the individual 16 scales of the QOLI were statistically significant in predicting success. Finally, I looked at whether there was a difference in perceived success, as measured by the Oswestry Disability Index, between patients who were workers' compensation and those who were not. None of the null hypothesis could be rejected meaning that QOLI scores are not predictive of success in an IPMP. QOLI scores should not be used as a predictive factor for success in an IPMP. There was no significant difference between patients who were on workers' compensation and those who were not. I, however, did not discount the importance of quality of life in the treatment of chronic pain. In fact, the DV (patients' perceived disability) was significantly improved when patients underwent treatment that focused on physiological, psychological, and social factors. An initial poor quality of life does not determine success. Success is possible, even for those individuals who have a difficult time finding hope and happiness in their everyday life.

References

Babbie, E. (2007). *The practice of social research* (11th ed.). Belmont, CA: Thomson Higher Education.

Becker, M. A., Reib, L. M., & Shaw, B. R. (2014). Quality of life assessment manual. Retrieved from http://wqli.fmhi.usf.edu/_docs/wqli-instruments/QualityOfLifeAssessmentManual.pdf

Bloomberg, L. D., & Volpe, M. (2012). *Completing your dissertation: A roadmap from beginning to end* (2nd ed.). Thousand Oaks, CA: Sage.

Bosy, D., Etlin, D., Corey, D., & Lee, J. W. (2010). An interdisciplinary pain rehabilitation programme: Description and evaluation of outcomes. *Physiotherapy Canada*, *62*(4), 316–26. doi:10.3138/physio.62.4.316

Borsbo, B., Gerdle, B., & Peolsson, M. (2010). Impact of the interaction between self-efficacy, symptoms and catastrophising on disability, quality of life and health in with chronic pain patients. *Disability and Rehabilitation 32*(17), 1387-96. doi**:** 10.3109/09638280903419269

Bruns, D., Mueller, K., & Warren, P. A. (2012). Biopsychosocial law, health care reform, and the control of medical inflation in Colorado. *Rehabilitation Psychology, 57*(2), 81–97. doi:10.1037/a0028623

Casey, G. (2014). Understanding chronic pain. *Kai Tiaki Nursing New Zealand, 20*(9), 20-24 Retrived from http://www.nzno.org.nz/

Centers for Disease Control and Prevention. (2010). Chronic disease and health promotion. Retrieved from http://www.cdc.gov/chronicdisease/overview/index.htm

Centers for Medicare and Medicaid Services. (2012). National health care expenditure data. Retrieved from http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/index.html?redirect=/nationalhealthexpenddata/

Choi, Y. S., Kim, D. J., Lee, K. Y., Park, Y. S., Cho, K. J., Lee, J. H., … Shin, B. J. (2014). How does chronic back pain influence quality of life in Koreans: A cross-sectional study. *Asian Spine Journal*, *8*(3), 346–52. doi:10.4184/asj.2014.8.3.346

Clark, C. M. (2005). Relations between social support and physical health. Retrieved from http://www.personalityresearch.org/papers/clark.html

Collen, M. (2010). FDA risk evaluation and mitigation strategies program. *Practical Pain Management, 10*(2), 50–51. doi 10.1016/j.nurpra.2012.06.011

Colorado State University. (2010). Advantages and disadvantages of using secondary analysis. Retrieved from http://writing.colostate.edu/guides/research/survey /com4c2a.cfm

Cowan, P. (2011). Living with chronic pain. *Quality Of Life Research, 20*(3), 307–308. doi:10.1007/s11136-010-9765-7

Damsgård, E., Dewar, A., Røe, C., & Hamran, T. (2011). Staying active despite pain: Pain beliefs and experiences with activity-related pain in patients with chronic musculoskeletal pain. *Scandinavian Journal of Caring Sciences, 25*(1), 108–116. doi:10.1111/j.1471-6712.2010.00798.x

Dopson, L. (2010). Role of pain management programmes in chronic pain. *Nursing Standard*, *25*(13), 35–40. http://dx.doi.org/10.7748/ns2010.12.25.13.35.c8120

Fairbank J. C., Couper J., & Davies J. B. (1980). The Oswestry low back pain questionnaire. Physiotherapy 1980. Retrieved from https://www.workcover.com/documents.ashx?id=1295

Fairbank, J. C., & Pynsent, P. B. (2000). The Oswestry Disability Index. *Spine, 25*, 2940–2952. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11074683

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2013). G*Power version 3.1.7 [computer software]. Uiversität Kiel, Germany. Retrieved from http://www.psycho.uni-duesseldorf.de/abteilungen/aap/gpower3/download-and-register

Ferrans, C. E., & Powers, M. J. (1985). Quality of Life Index: Development and psychometric properties. *Advances in Nursing Science, 8*, 15–24. http://dx.doi.org/10.1097/00012272-198510000-00005

Gannon, B., Finn, D. P., Gorman, D. O., Ruane, N., & McGuire, B. E. (2013). The cost of chronic pain: An analysis of a regional pain management service in Ireland. Pain Medicine (14), 1518–1528. doi 10.1111/pme.12202

Gatchel, R. J. (2004). Comorbidity of chronic pain and mental health disorders: The biopsychosocial perspective. *American Psychologist*, *59*(8), 795–805. doi:10.1037/0003-066X.59.8.795

Gatchel, R. J., McGeary, D. D., McGeary, C. A., & Lippe, B. (2014). Interdisciplinary chronic pain management: Past, present, and future. *American Psychologist*, 69(2), 119–130. doi:10.1037/a0035514

Gatchel, R. J., & Okifuji, A. (2006). Evidence-based scientific data documenting the treatment and cost-effectiveness of comprehensive pain programs for chronic nonmalignant pain. *Journal of Pain*, 7(11), 779–793. http://dx.doi.org/10.1016/j.jpain.2006.08.005

Gatchel, R. J., Peng, Y., Peters, M. L., Fuchs, P. N., & Turk, D. C. (2007). The biopsychosocial approach to chronic pain: Scientific advances and future directions. *Psychological Bulletin*, *133*(4), 581–624. doi:10.1037/0033-2909.133.4.581

Hanssen, M., Vancleef, L., Vlaeyen, J., & Peters, M. (2014). More optimism, less pain! The generalized and pain-specific expectations on experienced cold-pressor pain. Journal of Behavioral Medicine, *37*, 47-58. doi: 10.1007/s10865-012-9463-8

HealthyPeople.gov. (2010). Health-related quality of life and well-being. Retrieved from http://www.healthypeople.gov/2020/about/QoLWBabout.aspx

Held, B. S. (2002). The tyranny of the positive attitude in America: Observation and speculation [Special issue]. *Journal of Clinical Psychology*, *58*(9), 965–91. doi:10.1002/jclp.10093

Hellman, C. M., Pittman, M. K., & Munoz, R. T. (2013). The First Twenty Years of the Will and the Ways: An Examination of Score Reliability Distribution on Snyder's Dispositional Hope Scale. *Journal of Happiness Studies*, *14*(3), 723–729. doi:10.1007/s10902-012-9351-5

Howell, D. C. (2010). *Statistical methods for psychology* (7th ed.). Belmont, CA: Wadsworth Cengage Learning.

Howren, M., Christensen, A. J., Karnell, L., & Funk, G. F. (2010). Health-related quality of life in head and neck cancer survivors: Impact of pretreatment depressive symptoms. *Health Psychology*, *29*(1), 65–71. doi:10.1037/a0017788

Institute of Medicine. (2011). Relieving pain in America: a blueprint for transforming prevention, care, education, and research. Retrieved from http://www.nap.edu/openbook.php?record_id=13172

Keefe, F. J., & Wren, A. A. (2013). Optimism and pain: A positive move forward. *Pain*, *154*(1), 7–8. doi:10.1016/j.pain.2012.10.005

Kumar, A., Gupta, V., & Maurya, A. (2010). Mental health and quality of life of chronic pelvic pain and endometriosis patients. *SIS Journal of Projective Psychology & Mental Health*, *17*(2), 153–157. Retrieved from Academic Search Premier, Ipswich, MA

Laisné, F., Lecomte, C., & Corbière, M. (2012). Biopsychosocial predictors of prognosis in musculoskeletal disorders : A systematic review of the literature, *34*(May 2011), 355–382. doi:10.3109/09638288.2011.591889

Lechnry, R., & Lechnry, T. (2010). Psychologists as primary care providers. *Practical Pain Management, 10*(2), 38–51. Retrieved from http://www.practicalpainmanagement.com/treatments/psychological/psychologists-primary-care-providers

Lefevre, P. (2013). Emerging trends in the adoption of treatment guidelines at the state level. *Professional Case Management*, *18*(1), 41-47. doi:10.1097/NCM.0b013e3182769f7e

Lima, E. (2013). Chronic pain and mental health: Moving beyond the conceptualization of pain as the fifth vital sign. *North Carolina Medical Journal, 74*(3), 229-231. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/23940894

Louw, A., Puentedura, E. L., & Mintken, P. (2012). Use of an abbreviated neuroscience education approach in the treatment of chronic low back pain: A case report. *Physiotherapy Theory and Practice, 28*, 50–62. http://dx.doi.org/10.3109/09593985.2011.562602

Lumley, M. a, Cohen, J. L., Borszcz, G. S., Cano, A., Radcliffe, A. M., Porter, L. S., … Keefe, F. J. (2011). Pain and emotion: A biopsychosocial review of recent research. *Journal of Clinical Psychology*, *67*(9), 942–68. doi:10.1002/jclp.20816

Manjiani, D., Paul, D. B., Kunnumpurath, S., Kaye, A. D., & Vadivelu, N. (2014). Availability and Utilization of Opioids for Pain Management : Global Issues, 208–215. Retrieved from http://www.researchgate.net/publication/263208729_Availability_and_Utilization_of_Opioids_for_Pain_Management_Global_Issues

McGeary, D. D., Seech, T., Peterson, A. L., McGeary, C. A., Gatchel, R. J., & Vriend, C. (2012). Health care utilization after interdisciplinary chronic pain treatment: Part I. Description of utilization of costly health care interventions. *Journal of Applied Biobehavioral Research*, *17*(4), 215–228. doi:10.1111/jabr.12001

Medical Treatment Utilization Schedule. (2009). Retrieved from http://www.dir.ca.gov/dwc/mtus/mtus_regulationsguidelines.html

Meevissen, Y. M. C., Peters, M. L., & Alberts, H. J. E. M. (2011). Become more optimistic by imagining a best possible self: Effects of a two week intervention. *Journal of Behavior Therapy and Experimental Psychiatry*, *42*(3), 371–8. doi:10.1016/j.jbtep.2011.02.012

Mehra, M., Nicholl, H. K., & Schadrack, J. (2012). The burden of chronic low back pain with and without a neuropathic component: A healthcare resource use and cost analysis. *Journal of Medical Economics, 15*(2), 245-252. doi: 10.3111/13696998.2011.642090

Morgan, G. A., Leech, N. L., Gloekner, G. W., & Barrett, K. C. (2007). *SPSS for introductory statistics: Use and interpretation* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Ong, A. D., Reid, M. C., & Zautra, A. J. (2010). Psychological resilience predicts decreases in pain catastrophizing through positive emotions. *Psychology and Aging, 25*(3), 516–523. http://dx.doi.org/10.1037/a0019384

Pagano, R. R. (2009). *Understanding statistics in the behavioral sciences* (9th ed.). Belmont, CA: Wadsworth Cengage Learning.

Park, S. H., & Sonty, N. (2010). Positive affect mediates the relationship between pain-related coping efficacy and interference in social functioning. *The Journal of Pain: Official Journal of the American Pain Society*, *11*(12), 1267–73. doi:10.1016/j.jpain.2010.02.023

Peters, M. L., Flink, I. K., Boersma, K., & Linton, S. J. (2010). Manipulating optimism: Can imagining a best possible self be used to increase positive future expectancies? *The Journal of Positive Psychology*, *5*(3), 204–211. doi:10.1080/17439761003790963

Pulvers, K., & Hood, A. (2013). The role of positive traits and pain catastrophizing in pain perception. *Current Pain and Headache Reports*, *17*(5), 330. doi:10.1007/s11916-013-0330-2

Rogerson, M. D., Gatchel, R. J., & Bierner, S. M. (2010). A Cost utility analysis of interdisciplinary early intervention versus treatment as usual for high-risk acute low back pain patients. *Pain Practice*, *10*(5), 382–395. doi:10.1111/j.1533-2500.2009.00344.x

Scascighini, L., Litschi, M., Walti, M., & Sprott, H. (2011). Effect of an interdisciplinary outpatient pain management program (IOPP) for chronic pain patients with and without migration background: A prospective, observational clinical study. *Pain Medicine, 12*(5), 706–716. doi:10.1111/j.1526-4637.2011.01085.x

Seligman, M.E.P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. American Psychologist, 55, 5-14. doi 10.1037//0003-066X.55.1.5

Sessle, B. J. (2011). Pain management challenges: Research, access, costs, education, and public awareness. *Future Medicine*, *1*, 25–29. doi 10.2217/pmt.10.14

Stevens, J. P. (2009). *Applied multivariate statistics for the social sciences* (5th ed.). Mahwah, NJ: Routledge Academic.

Tabachnick, B. G., & Fidell, L. S. (2012). *Using multivariate statistics* (6th ed.). Boston, MA: Pearson.

The American Academy of Pain Medicine. (2012). AAPM facts and figures on pain. Retrieved from http://www.painmed.org/patientcenter/facts-on-pain/

Wahl, A. K., Rustøen, T., Rokne, B., Lerdal, A., Knudsen, Ø., Miaskowski, C., & Moum, T. (2009). The complexity of the relationship between chronic pain and quality of life: A study of the general Norwegian population.

Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care & Rehabilitation, *18*(8), 971–980. doi:10.1007/s11136-009-9515-x

Wong, P. T. P. (2011). Positive psychology 2.0: Towards a balanced interactive model of the good life. *Canadian Psychology/Psychologie Canadienne*, *52*(2), 69–81. doi:10.1037/a0022511

Zautra, A. J., Arewasikporn, A., & Davis, M. C. (2010). Resilience: Promoting well-being through recovery, sustainability, and growth. *Research in Human Development*, *7*(3), 221–238. doi:10.1080/15427609.2010.504431

Appendix A: Data Use Agreement

DATA USE AGREEMENT

This Data Use Agreement ("Agreement"), effective as of June 11, 2015, is entered into by and between Michelle Laird ("Data Recipient") and Summit Pain Management Institute ("Data Provider"). The purpose of this Agreement is to provide Data Recipient with access to a Limited Data Set ("LDS") for use in research **in accord with laws and regulations of the governing bodies associated with the Data Provider, Data Recipient, and Data Recipient's educational program.** In the case of a discrepancy among laws, the agreement shall follow whichever law is more strict.

1. <u>Definitions.</u> Due to the study's affiliation with Laureate, a USA-based company, unless otherwise specified in this Agreement, all capitalized terms used in this Agreement not otherwise defined have the meaning established for purposes of the USA "HIPAA Regulations" and/or "FERPA Regulations" codified in the United States Code of Federal Regulations, as amended from time to time.
2. <u>Preparation of the LDS.</u> Data Provider shall prepare and furnish to Data Recipient a LDS in accord with any applicable laws and regulations of the governing bodies associated with the Data Provider, Data Recipient, and Data Recipient's educational program.
3. <u>Data Fields in the LDS.</u> **No direct identifiers such as names may be included in the Limited Data Set (LDS).** In preparing the LDS, Data Provider shall include the **data fields specified as follows**, which are the minimum necessary to

accomplish the research: Quality of Life assessment scores, Oswestry Disability Index scores, and insurance statues (workers' compensation or other).

4. <u>Responsibilities of Data Recipient.</u> Data Recipient agrees to:
   a. Use or disclose the LDS only as permitted by this Agreement or as required by law;
   b. Use appropriate safeguards to prevent use or disclosure of the LDS other than as permitted by this Agreement or required by law;
   c. Report to Data Provider any use or disclosure of the LDS of which it becomes aware that is not permitted by this Agreement or required by law;
   d. Require any of its subcontractors or agents that receive or have access to the LDS to agree to the same restrictions and conditions on the use and/or disclosure of the LDS that apply to Data Recipient under this Agreement; and
   e. Not use the information in the LDS to identify or contact the individuals who are data subjects.
5. <u>Permitted Uses and Disclosures of the LDS.</u> Data Recipient may use and/or disclose the LDS **for its Research activities only.**

6. Term and Termination.

   a. Term. The term of this Agreement shall commence as of the Effective Date and shall continue for so long as Data Recipient retains the LDS, unless sooner terminated as set forth in this Agreement.

   b. Termination by Data Recipient. Data Recipient may terminate this agreement at any time by notifying the Data Provider and returning or destroying the LDS.

   c. Termination by Data Provider. Data Provider may terminate this agreement at any time by providing thirty (30) days prior written notice to Data Recipient.

   d. For Breach. Data Provider shall provide written notice to Data Recipient within ten (10) days of any determination that Data Recipient has breached a material term of this Agreement. Data Provider shall afford Data Recipient an opportunity to cure said alleged material breach upon mutually agreeable terms. Failure to agree on mutually agreeable terms for cure within thirty (30) days shall be grounds for the immediate termination of this Agreement by Data Provider.

   e. Effect of Termination. Sections 1, 4, 5, 6(e) and 7 of this Agreement shall survive any termination of this Agreement under subsections c or d.

7. Miscellaneous.

   a. Change in Law. The parties agree to negotiate in good faith to amend this Agreement to comport with changes in federal law that materially alter either or both parties' obligations under this Agreement. Provided however, that if the parties are unable to agree to mutually acceptable amendment(s) by the compliance date of the change in applicable law or regulations, either Party may terminate this Agreement as provided in section 6.

b. Construction of Terms. The terms of this Agreement shall be construed to give effect to applicable federal interpretative guidance regarding the HIPAA Regulations.

c. No Third Party Beneficiaries. Nothing in this Agreement shall confer upon any person other than the parties and their respective successors or assigns, any rights, remedies, obligations, or liabilities whatsoever.

d. Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

e. Headings. The headings and other captions in this Agreement are for convenience and reference only and shall not be used in interpreting, construing or enforcing any of the provisions of this Agreement.

IN WITNESS WHEREOF, each of the undersigned has caused this Agreement to be duly executed in its name and on its behalf.

DATA PROVIDER **DATA RECIPIENT**

Signed: ________________________

Print Name: ____________________

Print Title: _____________________

Signed: _________________

Print Name: _____________

Print Title: _______________

Appendix B: Oswestry Disability Index

Oswestry Disability Questionnaire

This questionnaire has been designed to give us information as to how your back or leg pain is affecting your ability to manage in everyday life. Please answer by checking one box in each section for the statement which best applies to you. We realize you may consider that two or more statements in any one section apply but please just shade out the spot that indicates the statement which most clearly describes your problem.

Section 1: Pain Intensity
I have no pain at the moment
The pain is very mild at the moment
The pain is moderate at the moment
The pain is fairly severe at the moment
The pain is very severe at the moment
The pain is the worst imaginable at the moment

Section 2: Personal Care (e.g. washing, dressing)
I can look after myself normally without causing extra pain
I can look after myself normally but it causes extra pain
It is painful to look after myself and I am slow and careful
I need some help but can manage most of my personal care
I need help every day in most aspects of self-care
I do not get dressed, wash with difficulty and stay in bed

Section 3: Lifting
I can lift heavy weights without extra pain
I can lift heavy weights but it gives me extra pain
Pain prevents me lifting heavy weights off the floor but I can manage if they are conveniently placed e.g. on a table
Pain prevents me lifting heavy weights but I can manage light to medium weights if they are conveniently positioned
I can only lift very light weights
I cannot lift or carry anything

Section 4: Walking*
Pain does not prevent me walking any distance

Pain prevents me from walking more than 2 kilometers
Pain prevents me from walking more than 1 kilometer
Pain prevents me from walking more than 500 meters
I can only walk using a stick or crutches
I am in bed most of the time

Section 5: Sitting
I can sit in any chair as long as I like
I can only sit in my favorite chair as long as I like
Pain prevents me sitting more than one hour
Pain prevents me from sitting more than 30 minutes
Pain prevents me from sitting more than 10 minutes
Pain prevents me from sitting at all

Section 6: Standing
I can stand as long as I want without extra pain
I can stand as long as I want but it gives me extra pain
Pain prevents me from standing for more than 1 hour
Pain prevents me from standing for more than 30 minutes
Pain prevents me from standing for more than 10 minutes
Pain prevents me from standing at all

Section 7: Sleeping
My sleep is never disturbed by pain
My sleep is occasionally disturbed by pain
Because of pain I have less than 6 hours sleep
Because of pain I have less than 4 hours sleep
Because of pain I have less than 2 hours sleep
Pain prevents me from sleeping at all

Section 8: Sex Life (if applicable)
My sex life is normal and causes no extra pain
My sex life is normal but causes some extra pain
My sex life is nearly normal but is very painful
My sex life is severely restricted by pain
My sex life is nearly absent because of pain
Pain prevents any sex life at all

Section 9: Social Life
My social life is normal and gives me no extra pain
My social life is normal but increases the degree of pain

Pain has no significant effect on my social life apart from limiting my more energetic interests e.g. sport
Pain has restricted my social life and I do not go out as often
Pain has restricted my social life to my home
I have no social life because of pain

Section 10: Travelling

I can travel anywhere without pain
I can travel anywhere but it gives me extra pain
Pain is bad but I manage journeys over two hours
Pain restricts me to journeys of less than one hour
Pain restricts me to short necessary journeys under 30 minutes
Pain prevents me from travelling except to receive treatment

Score: /   x 100 =   %

Scoring: For each section the total possible score is 5: if the first statement is marked the section score = 0, if the last statement is marked it = 5. If all ten sections are completed the score is calculated as follows:

Example: 16 (total scored)
50 (total possible score) x 100 = 32%

If one section is missed or not applicable the score is calculated:
16 (total scored)
45 (total possible score) x 100 = 35.5%

Minimum Detectable Change (90% confidence): 10%points (Change of less than this may be attributable to error in the measurement)

Source: Fairbank JCT & Pynsent, PB (2000) The Oswestry Disability Index. Spine, 25(22):2940-2953. Davidson M & Keating J (2001) A comparison of five low back disability questionnaires: reliability and responsiveness. Physical Therapy 2002;82:8-24.

*Note: Distances of 1mile, ½ mile and 100 yards have been replaced by metric distances in the Walking section.