

IMPACT OF THERAPIES ON PAIN PERCEPTION AND PSYCHOLOGICAL  
SEQUELAE IN CHRONIC PAIN PATIENTS

THESIS

Presented to the Graduate Council of  
Texas State University-San Marcos  
in Partial Fulfillment  
of the Requirements

For the Degree

Master of ARTS

by

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San Marcos, Texas  
May 2011

IMPACT OF THERAPIES ON PAIN PERCEPTION AND PSYCHOLOGICAL  
SEQUELAE IN CHRONIC PAIN PATIENTS

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## DEDICATION PAGE

I would like to dedicate this manuscript to my loving parents, Dr. George and Renae Helden, as well as my best friend Derrick Richardson. The completion of this project is the product of their continual support, encouragement, and love.

## ACKNOWLEDGEMENTS

First I must thank my committee chair and personal advisor Dr. Natalie Ceballos. I treasure all her encouragement and assistance while completing my thesis as well as my studies. I am grateful for her support of me professionally and personally.

I would also like to thank Dr. Ollie Seay, who also served as a committee member, for her consistent advice and professional guidance.

I am thankful for Dr. Azucena Mayberry who gave her time and effort to the statistical analyses of this project as well as her constant support and encouragement.

I would like to acknowledge Dr. Joseph Etherton who also provided assistance during this process and has acted as an honorary member of my committee when needed.

Finally, I would like to thank Dr. Krista Jordan and the team at Restore FX for their resources as well as inspiration. I have admired their work and am encouraged by their genuine care and the services they provide.

This manuscript was submitted on March 11, 2011.

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## **ABSTRACT**

### **IMPACT OF THERAPIES ON PAIN PERCEPTION AND PSYCHOLOGICAL SEQUELAE IN CHRONIC PAIN PATIENTS**

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May 2011

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Chronic Pain is a growing problem in the United States. In recent years, a variety of models and therapies have been adopted to address this issue. However, additional research is needed to verify the efficacy of existing approaches. To this end, the current chart review study was designed to assess the effectiveness of an outpatient program designed to address pain, depression, and anxiety among chronic pain patients in Austin, Texas. It was hypothesized that improvement in these areas would vary based on the background characteristics of program clientele. However, through analysis using repeated measures multivariate analysis of variance (MANOVA), it was found that demographics did not play a significant role in improvement, yet there was significant improvement over the course of time. Ultimately, discovery of significant relationships between demographic variables and improvement in symptoms associated with chronic pain could lead to more tailored treatments and greater therapeutic effectiveness.

## CHAPTER 1

### INTRODUCTION AND RATIONALE

Chronic pain can be debilitating for many people, and finding an effective treatment can be a challenging and frustrating process. Many facilities offer pain management and rehabilitation programs tailored to the specific needs of chronic pain patients. One such program is provided by the Restore FX facility in Austin, Texas. The program offered to clients includes therapies such as physical therapy, occupational therapy, group therapy, yoga, mindfulness, family therapy, as well as educational sessions that relate to chronic pain.

The purpose of this chart review study is to observe how therapies for chronic pain affect the psychological sequelae and success of patients. The proposed project has investigated the outcome of therapies targeting chronic pain, including physical therapy, occupational therapy, group therapy, and yoga. All clients have received the same series of treatments. The aim of the study is to learn more about the experience of chronic pain in men and women and to examine the interrelationships among pain, anxiety, and depression. There is a growing literature that suggests a difference between genders in response to pain. (Uruh,1996).

For this reason, the current study has addressed these issues by investigating depression and anxiety specifically. Depression and anxiety have been chosen for further study because of their high level of co-morbidity with chronic pain. In response to the aforementioned treatment regime, it was expected that improvement would be seen in

level of pain, depression, and anxiety. It could also be assumed that the pattern of change in pain, depression, and anxiety over time would differ by gender and perhaps among different ethnicities. Ultimately, this study has served to clarify the nature of the chronic pain experience in men and women. Practitioners could use this information to create more tailored treatment for chronic pain.

## CHAPTER 2

### LITERATURE REVIEW

Pain is a natural experience that we will all encounter throughout life. According to the Joint Commission on Accreditation of Healthcare Organizations, pain is considered one of the five vital signs along with pulse, blood pressure, core temperature, and respiration. Pain is defined as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (Gatchel & Okifuji, 2006). For pain to be considered a chronic condition, it typically must continue for a duration of at least three months. This type of pain is estimated to affect roughly 10-20% of adults (Blyth, March, Brnabic, Jorm, Williamson, & Cousins., 2001; Gureje, Bon Korff, Simon, & Gater, 1998; Verhaak, Kerssens, Dekker, Sorbi & Bensing, 1998). The conscious experience of pain is referred to as nociception (Gatchel, Peng, Funchs, Peters, & Turk, 2007). During nociception, the sensory information about pain is conveyed via the peripheral nervous system, through the spinal cord to the brain in order to be processed. In other words, we filter outside sensations through our internal world.

Chronic pain impacts individuals in many ways. While experiencing pain, patients may experience a multitude of effects such as: increased central nervous system activity, weakening of cognitive processes that promote health, disturbances in appetite, emotions/affect and sleep, and increased levels of cortisol (a stress hormone). Ultimately, the aforementioned symptoms may lead to an increase in utilization of health

care (Robinson & Riley, 1999). The emotional/affective component of the chronic pain experience is of particular interest in the current study. The emotion and cognition involved in pain are psychosocial factors, meaning they are psychologically and socially founded. Emotions are typically more immediate reactions, and cognitions are what attach meaning to those emotions and can cause a spiraling of additional emotions as well as an increase in the present experience (Gatchel et al., 2007).

The attachment of meaning to pain is called pain appraisal (Sharp, 2001). An individual's beliefs quite often determine how they appraise their experience; as a result, appraisals tend to vary from person to person (Gatchel et al., 2007). Appraisal of pain will also determine how a patient adjusts to chronic pain and can be used as a predictor of therapeutic outcomes (Jense, Romano, Turner, Good, & Walk, 1999; Turner, Jensen, & Romano, 2000). Maladaptive appraisals may occur when participants attach a negative meaning to pain, and the stress of these maladaptive appraisals and of the pain itself can have an adverse effect on a patient's psychological well being. To avoid some of the damage that can occur, it is important to promote down-regulation of arousal and focus on more adaptive strategies (Dixon, Keefe, Scipio, Perri, & Abernethy, 2007).

Chronic pain patients may also find themselves experiencing difficulty within social relationships. Normal interaction with people can be difficult when experiencing persistent pain. However, it is essential to physical and psychological well being to find ways to preserve these social ties (DeVellis, Lewis & Sterba, 2003). In addition to physical pain, patients commonly suffer psychological and emotional disturbances. According to Zautra and colleagues (2008), there is a high rate of co-morbidity of decreased mental and emotional health associated with chronic pain. For instance, it is

estimated that more than 87% of individuals in the US with chronic spinal pain also exhibit psychiatric symptoms (Von Korff, Crane, Lane, Miglioretti, Simon, Saunders, Stang, Brandenburg, & Kessler, 2005). There is also a high correlation between anxiety and depression among chronic pain patients (Mineka, Watson, & Clark, 1998). Given the comorbidity of these symptoms, it is interesting to consider their potential influence during the treatment of chronic pain. Often patients may feel anxiety due to unexplained symptomology. Patients may also feel anxiety toward physical limitation, lack of support or understanding from others, and financial uncertainties. There is a helplessness that accompanies chronic pain, which can often take the form of anxiety (Gatchel et al., 2007; Gatchel & Okifuji, 2006). Anxiety creates tension and strain within the mind and body. Clients often become hypervigilant, closely monitoring all bodily sensations as well as emotions. For example, some may use improper posture as a protective agent, which ultimately leads to further injury or exacerbation of their pain. Others may believe they have other diseases or perhaps a tumor, which is usually irrational (Gatchel, 2005; Robinson & Riley, 1999). Psychosocially, patients may experience negativity and arousal of fears or anxiety (Vlaeyen & Linton, 2000). Fear and anxiety may ultimately exacerbate all symptoms (Vlaeyen, Kole-Snijders, Boeren, & van Eedk, 1995). It is important then for these patients to learn how to avoid or reduce these fears to mitigate their level of anxiety. McCracken & Gross (1998) found that reducing pain-related anxiety essentially predicts improvements in pain, functioning, affective distress, and pain-related obstacles with activity. It is estimated that 40-50% of chronic pain patients also suffer from depressive disorders (Banks & Kerns, 1996; Dersh, Gatchel, Mayer, Polatin, & Temple, 2006; Romano & Turner, 1985). There is a strong link between

depression and chronic pain. Von Korff & Simon (1996) report that physical and psychological illnesses have reciprocal effects; similarly, the relationship between pain and depression depends largely on cognition and affect. Studies suggest that, when a person experiencing chronic pain appraises their pain as not controlling and they can function, they are less likely to develop symptoms of depression (Rudy, Kerns, & Turk, 1988; Turk, Okifuji, & Scharff, 1995). For instance, in one study, scientists found that using cognitive behavioral therapy (CBT), mindfulness, meditation and emotion regulation greatly improved coping efficacy in patients with depression. Patients with recurrent depression reported that mindfulness and emotion regulation were most beneficial (Zautra, Davis, Reich, Nicassio, Tennen, Finan, Kratz, Parrish, & Irwin, 2008). Based on this research, the current study will focus on therapies reviewed by Zautra et al. (2008). These techniques are consistently used at Restore FX, and have shown improvements in clients' psychological well being; however, these effects have not previously been examined using scientific techniques. Thus, the proposed chart review project would serve to replicate the results of Zautra et al. (2008), as well as expand this line of research by considering potential gender differences in these factors.

The treatment of chronic pain does not simply address physical pathology, but may also encompass social and psychological concerns. When chronic pain patients experience symptoms of depression, they often feel helpless and may not feel motivated to comply with treatment (Robinson and Riley, 1999). Patients may also feel that their physicians do not believe they are in pain, which may create resentment toward the health care provider as well as manifest as anxiety and depression. Sometimes physicians may not be able to clearly identify the pathophysiological mechanisms from which the pain

complaints may stem. In order for patients to feel that their physician understands them and is competent, it is important that the physician remain open and honest even if they are unsure about the causality of the patient's pain (Gatchel & Okifuji, 2006).

Historically, clinics treated pain with local anesthesia and neural blockades. Currently, most clinics use techniques such as massage and biofeedback (Gatchel, & Okifuji, 2006). Some clinics approach pain from a predominantly medical viewpoint; whereas, others may approach pain more holistically. The success of improvement for chronic pain patients is greatly increased by using multidisciplinary therapies (Gatchel & Okifuji, 2006).

The multifaceted nature of chronic pain makes the biopsychosocial model the most logical choice of models to use when treating chronic pain. This model has been widely accepted as an effective strategy for chronic pain (Gatchel et al., 2007; Gatchel & Okifuji, 2006). The biopsychosocial model is also appropriate when distinguishing between nociception and pain as well as how the sensory and psychological aspects are interlaced (Gatchel et al., 2007). This method allows clinicians to attend to mood states as well as physical ailments. The biopsychosocial model is currently being used through the collaborative efforts of several disciplines. Some of these disciplines include physicians, physical therapists, and psychologists (Gatchel & Okifuji, 2006). Restore FX, the data collection site for the proposed thesis, also employs an interdisciplinary approach, which utilizes the biopsychosocial method.

## CHAPTER 3

### METHODS

#### *Participants*

The source of participants and data is Restore FX, a facility located in Austin, Texas which specializes in the treatment of chronic pain. Data have been collected from patients who have previously filled out questionnaires before, after, and during their therapy. Their time at restore occurred between 2008 and 2010. Participants included in this study have completed the program as well as completed all testing measures used in this study. There were approximately 36 male and 42 female participants. The chart review procedure used for this study was approved by the administration at Restore FX, and is covered by consent documents that are signed by the patients during the intake phase of their treatment experience. All participants are chronic pain patients who have undergone therapy at Restore FX.

Data were analyzed using a repeated measures MANOVA. Gender served as the grouping variable, and the dependent variable consists of self-report measures of anxiety, depression, and pain perception derived from testing packets completed at three different times throughout the program; 1) pre-treatment (entry), 2) during the program (week 2), and 3) post-treatment (discharge). It was expected that patterns would emerge, indicating how each gender handles feelings of depression, anxiety, and their experience of pain.

#### *Background Variables*

Patients' ages fall between 25 and 65. With regard to the approximate distribution of

ethnic background, 55% were Caucasian, 33% were Hispanic, 11% were African-American, and 1% were Asian. These demographic distributions are representative of the population of chronic pain patients in the geographical region served by Restore FX. The demographics of the participants that were analyzed in this study include 47% Caucasian, 37% hispanic, 15% African American, and there were not Asian patients in this study. These percentages are still representative of the population that Restore FX serves.

Based on previous data obtained from Restore FX, patients' typical states of health are reflected in the following percentages: 60% have a lower back diagnosis, 8% have a cervical diagnosis, 17% have pain in the upper extremities, 13% have pain in the lower extremities, 2% report total body pain, and 10% have multiple-site pain (which causes percentages to add up to more than 100%).

### *Design and Procedure*

This project investigates the outcome of therapies targeting chronic pain. These therapies include physical therapy, occupational therapy, psychoeducational group therapy, yoga, mindfulness, and family therapy. It was hoped that observations would show how these therapies affect the experience of pain and how each client displays symptoms of anxiety and depression. It was also expected that the greatest improvement would be from behavioral therapies as Zautra et al. (2008) found.

Due to a high co-morbidity of psychological disorders and emotional disturbances among pain patients, this study examined improvements in mental health as well as physical health. Measurements of pain, anxiety, and depression were collected via the McGill Pain Questionnaire (Melzack, 1975), the Beck Anxiety Inventory (Beck et al.,

1988), and the Beck Depression Inventory - Second Edition (Beck, Steer, & Brown, 1996).

There was no compensation to patients since they had already completed the test packets and their participation was essential for the program. There was essentially no contact required between the researchers and the participants.

#### *Self-Report Measures*

The McGill Pain Questionnaire (Melzack, 1975) was used as an index for improvement in the subjective experience of pain. This measure consists of 84 self-report items. It is intended to act as a psychometric assessment of pain syndromes. There are three primary domains that are measured. These domains include: sensory, affective, and evaluative domains (Boyle & Fernandez, 2010). The area of interest for this study included the rating of pain along a visual analog scale.

The Beck Anxiety Inventory (BAI; Beck et al., 1988) has been used to measure patients' level of anxiety as they progress through treatment. This assessment tool is made of 21 items that are rated on a scale of 0 to 3. These items are in relation to subjective symptoms of anxiety as well as somatic and pain related symptoms. Higher scores indicate a higher likelihood that the individual is more anxious. The BAI has been validated with populations who have a diagnosis of panic disorder with agoraphobia as well as panic disorder without agoraphobia, which may limit its sensitivity to more generalized worry rather than panic. Other disorders that the BAI is sensitive to include social phobia, obsessive-compulsive disorder, and generalized anxiety. Other studies providing reliability and validity have included mixed diagnostic groups, patients that meet criteria for anxiety disorders, and non-clinical samples (Dowd & Waller, 2010).

The internal consistency reliability range for the BAI is between .89 and .94. The BAI has a .75 test-retest coefficient. Limitations of the BAI include a very brief manual and very few studies of its measurement properties.

The Beck Depression Inventory – Second Edition (BDI-II; Beck et al., 1996) measures levels of depression that the clients may experience. This instrument consists of 21 items. Higher scores indicate greater severity of depressive symptoms. Each item has four statements that relate to a specific depressive symptom. Some of these depressive symptoms include mood, sense of failure, indecisiveness, work inhibition, and appetite (Lezak, Howieson & Loring, 2004). The BDI-II is sensitive to clinical needs of assessment and treatment. Its reliability has been demonstrated by a coefficient alpha of .92, and a .93 on test-retest (Arabisi & Farmer, 2010). The BDI-II was updated to bring items into compliance with the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV) criteria. One limitation includes its subjective nature, which may allow individuals to alter their presentation of symptoms.

#### *Data Analysis*

Data were analyzed using SPSS Version 17.0. The analysis technique used was a repeated measures multivariate analysis of variance (MANOVA). This technique was used to produce a clean outcome with no type 1 error. Gender was used as the independent variable, and dependent variables include anxiety, depression, and pain scores from the three testing sessions (pre-treatment (entry), during treatment (week 2), post-treatment (discharge)). Participants in the analysis included 36 males and 42 females, which should provide adequate power for the detection of significant differences between males and females over time.

## CHAPTER 4

### EXPECTED RESULTS

Over time, it was expected that participants' anxiety, depression, and pain would decrease; further, it was expected that males and females would differ in their patterns of recovery over time. Studies such as Zautra et al. (2008) have found that behavioral techniques, as well as mindfulness and emotional regulation, such as the ones implemented at Restore FX, have contributed to improvements in responses to chronic pain. Although the current participants did not benefit directly from the study (only de-identified previously collected data has been used), future patients could benefit from the clinical implementation of the findings of the study. According to Dowd & Waller (2010) it was expected that female participants would show higher levels of anxiety than men. Age was also an area that was to potentially be explored, in which we would expect to find younger individuals expressing more anxiety than older participants (Dowd & Waller, 2010).

## CHAPTER 5

### RESULTS

A repeated measures multivariate analysis of variance (MANOVA) was conducted with gender as the between-subjects variable and time of assessment as the within-subjects variable for three measures: depression (BDI-II), anxiety (BAI) and pain (VAS). Results from these analyses indicated no significant effects of gender or interactions of gender with time of assessment. Significant multivariate, within-subjects effects of time were noted (Pillai's Trace = .515;  $F(6,71)=12.586$ ;  $p<.001$ , Partial  $\eta^2 = .515$ ). Greenhouse-Geisser corrections were applied where necessary in follow-up analyses. Follow-up analyses indicated significant changes over time for BDI-II ( $F(1.76, 133.65)=38.913$ ;  $p<.001$ , Partial  $\eta^2= .339$ ), VAS ( $F(2,152)=10.723$ ;  $p<.001$ , Partial  $\eta^2=.124$ ), BAI ( $F(1.84, 139.57)=25.29$ ;  $p<.001$ , Partial  $\eta^2 =.250$ ). Bonferroni-corrected pairwise comparisons revealed that depression scores decreased over time, and depression level at all assessments differed significantly from one another ( $ps\leq.001$ ; See Figure 1). VAS scores slightly increased at time 2 and then significantly decreased at time 3; significant differences occur between time 1 and time 3 and time 2 and time 3 ( $ps<.004$ ; See Figure 2). Anxiety scores decreased over time, and anxiety level at all assessments differed significantly from one another ( $ps<.003$ ; See Figure 3).

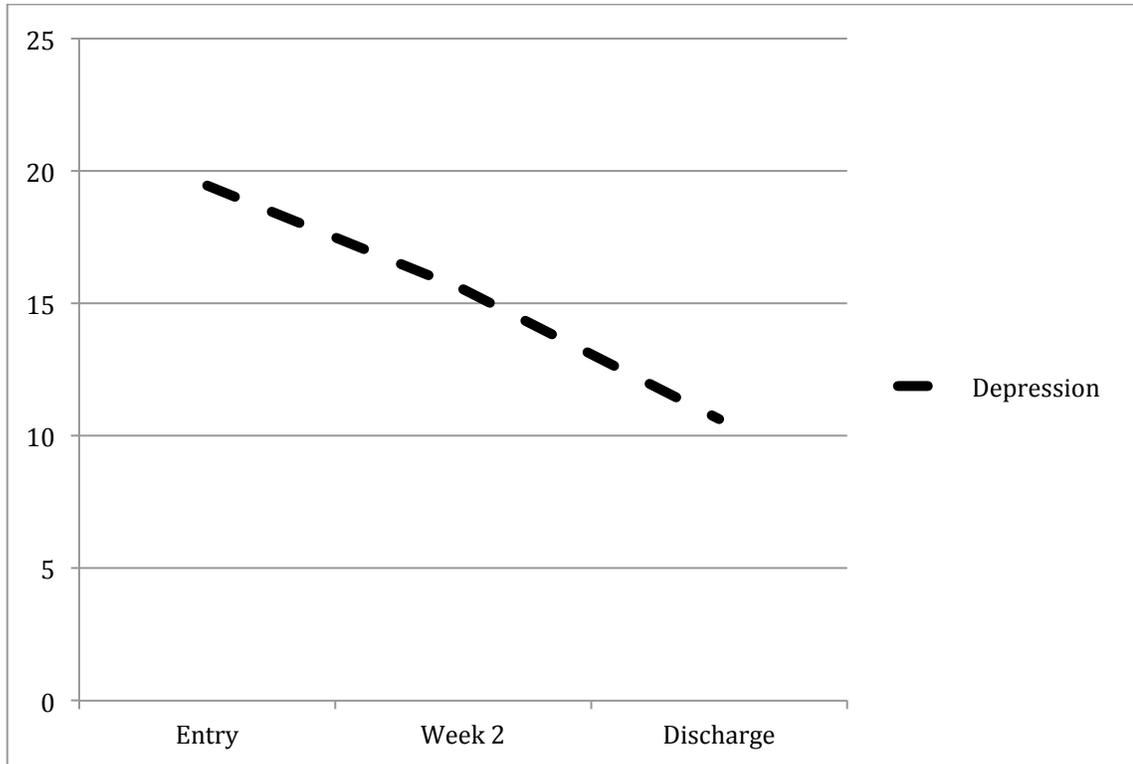


Figure 1. Depression Analysis

BDI-II ( $F(1.76, 133.65)=38.913; p<.001, \text{Partial } \eta^2= .339$ )

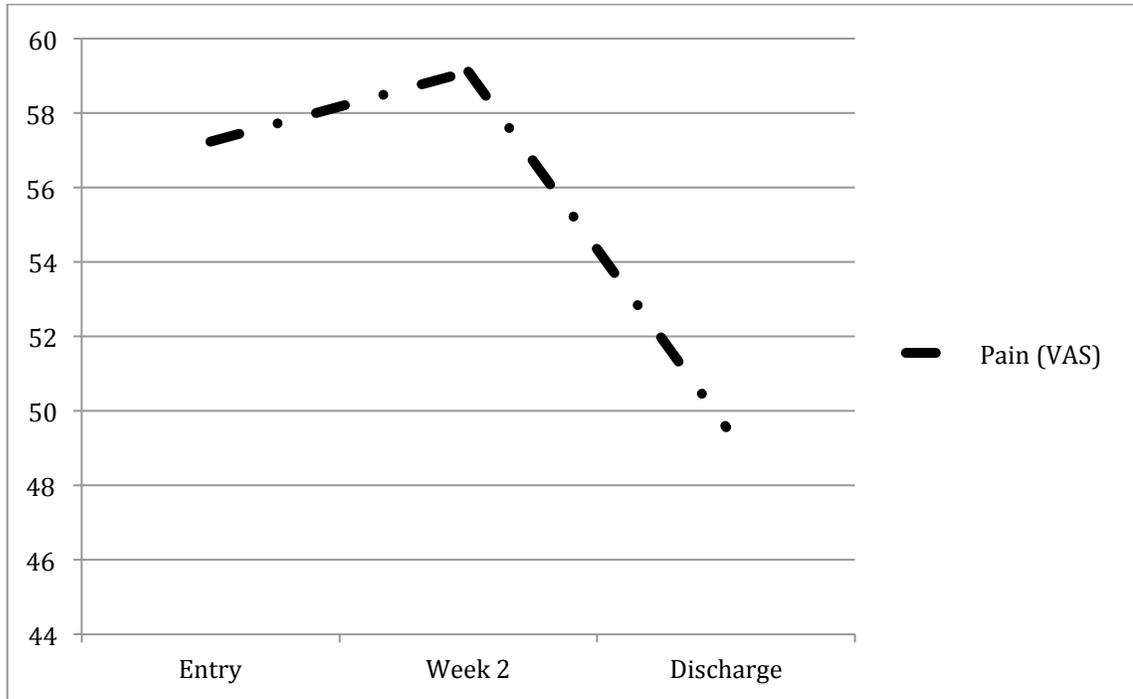


Figure 2. Pain Analysis

VAS ( $F(2,152)=10.723; p<.001, \text{Partial } \eta^2= .124$ )

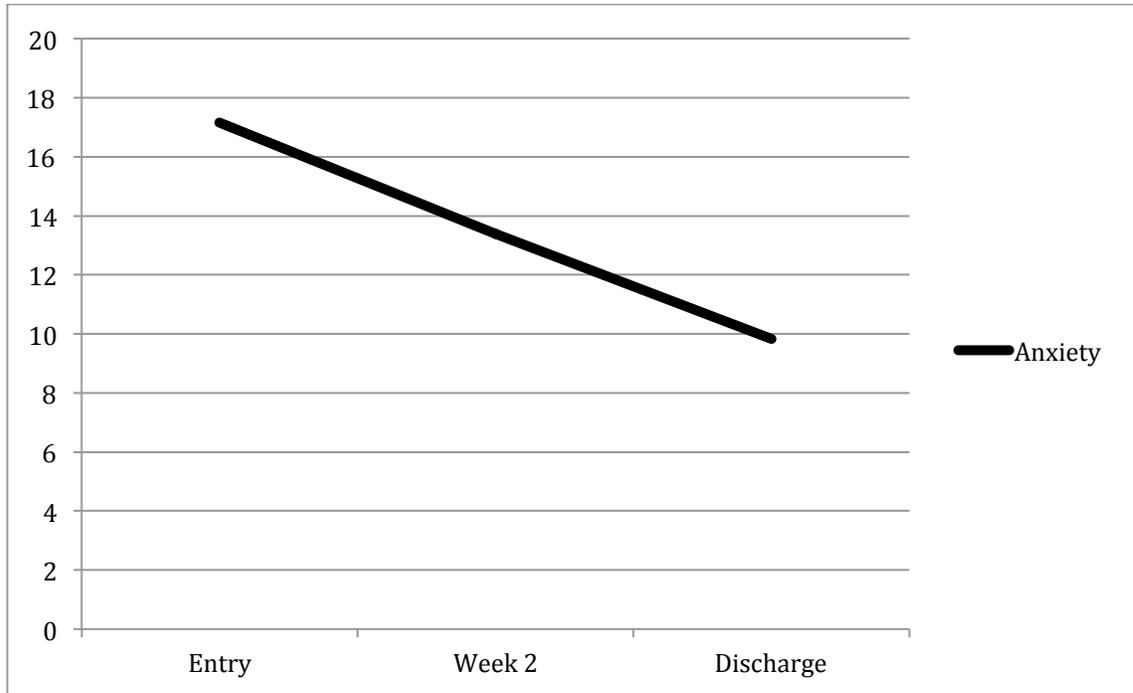


Figure 3. Anxiety Analysis

BAI ( $F(1.84, 139.57)=25.29; p<.001, \text{Partial } \eta^2 =.250$ )

## CHAPTER 6

### DISCUSSION

These results confirm expectations of improvement. The only trend not observed, that was expected, was a difference between groups (gender). The significance between times for anxiety and depression are consistent with other studies, such as Zautra et al. (2008). This reduction might indicate an improvement in cognitive appraisal as well as increased use of coping skills and adaptation. Throughout the program, patients are also learning how to down-regulate arousal and be more mindful of sensations in order to better control their pain as well as understanding the mind/body connection. Having social interactions with other patients may also contribute to improvement in mood.

The slight increase in pain before significant decrease is consistent with the physical demands experienced in such a program. As patients begin physical therapy, it is expected that the first week or two they experience soreness and a slight increase in pain before improvement due to prior atrophy and sedentary behaviors.

This study will increase the availability of information regarding the success of treatments when dealing with chronic pain. It can help to predict patterns of success throughout chronic pain programs. Using this information may help practitioners to better understand how treatment may affect certain populations and how to best utilize treatments. Although the current participants will not benefit directly from the study (only de-identified previously collected data was used), future patients could benefit from the clinical implementation of the findings of the study.

This chart review study provides only one method of examining the issues at hand. Although the chart review method provides excellent external validity, in that the results could be directly generalized to a larger group of pain patients undergoing similar treatments, the internal validity of this method is lower than that of a quasi-experimental study involving recruitment of new participants and/or assignments of patients into exclusive treatment groups (e.g., only yoga, only mindfulness meditation, only medication, only placebo medication, etc.). Given the time constraints of a thesis study, the chart review method provides the most timely, ethical, and externally valid method of addressing the current scientific question.

Clinically, the findings indicate how chronic pain patients experience and express their pain and the psychological factors that accompany physical symptoms, regardless of gender. If the way in which some patients will specifically respond to therapy can be determined, then it may create an opportunity for more efficient treatment plans for patients. Tailored therapies may also improve cost-effectiveness within health systems for chronic pain treatment.

#### *Limitations*

Some limitations of this study include not having direct contact with patients. It may be beneficial to conduct subjective interviews with them as well as looking at their data. The study was unable to use data from patients who had an early discharge from the program as well as data of patients that may be incomplete.

Some factors that are not possible to control, but certainly have an effect on the patient's experience of this program, are social support systems, SES, family history of depression or anxiety, medication regimine, and initial physical condition. When

available, these data will be collected, coded, and retained for possible use as covariates in secondary analyses, if appropriate.

*Recommendation for Further Study*

For further exploration of this topic, it would be interesting to evaluate quality of life in conjunction with these measures. It would also be interesting to observe patterns in kinesiophobia, which is typically measured with the Tampa Scale of Kinesiophobia (TSK), as well as catastrophization of pain, measured with the Chronic Pain Acceptance Questionnaire (CPAQ). These scores may further indicate how patients experience their pain throughout their time in this particular program. Another avenue of research would be to covary for effects of age, time within the program, and ethnicity. There are many possibilities for further research with this population, and hopefully this study will serve as a springboard in continuing to understand how therapies impact pain perception and psychological sequelae in chronic pain patients.

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