

EFFECTS OF HYPNOSIS IN THE TREATMENT OF RESIDUAL  
STUMP PAIN AND PHANTOM LIMB PAIN

By

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To the Faculty of Washington State University:

The members of the Committee appointed to examine the dissertation of  
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EFFECTS OF HYPNOSIS IN THE TREATMENT OF RESIDUAL  
STUMP PAIN AND PHANTOM LIMB PAIN

Abstract

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On the basis of Hilgards (1977) neo-dissociation theory of hypnosis, this research tested the effects of hypnosis for stump and phantom limb pain intensity. The participants (n=20) were randomly assigned to the hypnosis treatment or control group based on scores of 2 or greater on the Stanford Hypnotic Clinical Scale. All participants' completed the modified Amputee Questionnaire, monitored pain on a daily basis, as well as completed the pre and post measures of the McGill Pain Questionnaire (MPQ). The treatment group completed pre and posthypnotic pain measures.

Following three individualized hypnosis sessions, the scores of participants in the treatment group at posttest were found to significantly differ from treatment group pretest scores and the control group post-test on Pain Rating Intensity total, Number of Chosen Words, and the Present Pain Intensity on the MPQ. Groups were found to be similar at pretest. The treatment group had significantly lower mean scores on their last recorded week on the Daily Pain Rating Scale compared to week 1 and compared to the control group at time 2. The results also indicated that the means for prehypnotic

pain at times 1, 2, and 3 were significantly different respectively from the means recorded on each of the post measures.

This study supports the use of hypnosis in the treatment of stump and phantom limb pain. Strengths, limitations, and conclusions are all discussed in detail in the discussion.

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## **Dedication**

This dissertation is dedicated to my partner and my family for their understanding and support throughout this long journey.

## CHAPTER ONE

### INTRODUCTION

Annually, approximately 120,000 people face losing a leg in the US (Sokolowska, 2001). This figure reflects only amputations directly resulting from non-traumatic events such as neoplastic malignancies, sepsis, vascular disorders, congenital deformities, and arthritis. This number is further increased by approximately 40,000 when amputations due to traumatic injuries are included (Methodist Health Care System, 2003). Injuries are considered traumatic for example when they result from motor vehicle accidents, industrial accidents, gunshot wounds, or war-related injuries.

The majority of non-traumatic lower limb amputations result from vascular problems such as diabetes. Diabetes is thought to be the cause of approximately 75% of amputations (Methodist Health Care System, 2003; Sokolowska, 2001; Walter, 2001) and the cause of 3% of deaths across the nation each year (CDC, 1999). These numbers are even higher in West Virginia, which now has the third highest rate of diabetes-related deaths and illnesses in the US (CDC, 1999). During the lifetime of their illness, between 45 and 83 percent of diabetics will have an amputation due to diabetes-related complications, and 40 percent of those experiencing an initial amputation will experience two or more additional amputations (Sokolowska, 2001; Walter, 2001).

It was once believed that at most 50% of amputees would experience phantom limb pain following amputation (Parkes, 1973); however, the current literature estimates that between 50 and 87% of amputees will experience phantom limb pain at some point post-amputation (Flor, 2002; Kiefer, et al., 2002; Nikolajsen, Ilkjaer, Kroner,

Christensen, & Jensen, 1997). Further, residual stump pain has long been associated with phantom limb pain in as many as 80% of amputees (Nikolajsen et al., 1997; Parkes, 1973). However, it is difficult to know what the actual percentages are for this population as there have been few empirical studies on this topic, which make generalizations difficult.

It is important at this point to make a distinction between phantom limb pain and residual stump pain. Phantom limb pain is reported as the painful sensations experienced in the area of the amputated limb following amputation. The pain can occur in the arm, leg, finger, breast, ear, or even internal organs that have been removed (Ramachandran & Hirstein, 1998). The phantom pain can begin directly following amputation, weeks or even years later (Postone, 1987). Onset directly following amputation is more commonly cited in the literature. The pain is frequently intermittent, chronic, and can go on for years. It may worsen with time and may be brought on by actions as simple as shaving the face, walking, or stimulating certain areas of the body such as the groin (Ramachandran & Hirstein, 1998). The person may experience the missing limb as having a definite form. At times, amputees report the limb as shrinking in size (telescoping) or being in an uncomfortable contorted position (Katz & Melzack, 1990; Postone, 1987). The pain can frequently be similar to pain or sensations felt in the limb prior to amputation. For example, if the leg had pain that felt sharp, cramping, and burning, it is likely that the phantom limb pain may be described similarly. The pain may also be similar to previous injuries and pain felt in that area of the body such as arthritis in the joints (Ramachandran & Hirstein, 1998).



It was once believed that phantom limb pain was solely psychological in nature until the mechanisms for referred pain such as sciatic leg pains arising from the lumbar nerve root compression were discovered (Ramachandran & Hirstein, 1998; Sherman, Sherman, & Bruno, 1987). Psychological aspects can exacerbate the intensity of the pain and lead to decreased coping with pain (Sherman et al., 1987). Today it is known that there are physiological causes for phantom limb pain; however, there continues to be controversy among researchers as to what the exact mechanism/s might be (Sherman, 1997). Amputees who experience phantom limb pain may feel they are becoming psychiatrically disturbed, or they are imagining things that are not there, so they may not readily share this experience with their health care providers (Ramachandran & Hirstein, 1998; Sherman et al., 1987). This can make diagnosis and treatment of phantom pain difficult, and may contribute to the lack of research in this area.

Whereas phantom pain is “felt” in the body part that has been removed, residual stump pain is the pain felt in the remaining limb or stump. Residual stump pain is expected directly following surgery, but typically subsides as the normal course of healing occurs. However, this pain often shifts from acute to chronic pain even though there are no obvious physical signs that the stump has a problem. The patient may continue to experience uncomfortable or painful sensations beyond the time expected for amelioration of this discomfort. Sherman (1994) reported that it is important to alleviate the pain while it is in acute phase, since once it becomes chronic it becomes much harder to treat. Over time, the stump may develop tissue deterioration, tenderness, bone spurs (a sharp outgrowth), bursitis (inflammation of fluid filled sacs) or

neuromas (abnormal regrowth of nerve fibers) that are chronic and painful conditions (Sherman, 1997).

Researchers are not sure what the exact mechanisms of stump pain are, but it is believed that they are directly related to phantom limb pain (Ramachandran & Hirstein, 1998). It is known that episodes of phantom limb pain are exacerbated by stump pain (Sherman, 1994). Sherman (1997) reported that electromyographic studies demonstrated that the major muscles in the residual stump tense up several seconds before the onset of phantom limb pain. Similar sensations are provoked during stimulation of nerves from a neuroma. This connection between stump and phantom limb pain is further strengthened by the fact that nerve blocks may temporarily relieve nerve pain (Ramachandran & Hirstein, 1998). The causal mechanism for phantom limb pain commonly seen in textbooks is that the pain arises from irritation of the severed axon terminals in the stump by presence of neuromas. This explanation is controversial and Melzack (1992) views it as inadequate since removing neuromas surgically fails to abolish phantom limb pain. Not all researchers agree with the standard definition; however, most will agree that stump pain and phantom limb pain are related by unknown mechanisms.

For the purpose of this research, residual stump pain and phantom limb pain will be considered together because the mechanism of action may be linked or the same and both respond to similar irritants and treatments. As can be seen from the above information, they are not experienced the same, but they may be triggered or relieved in similar ways. To date it is unclear what mechanism is involved in either stump pain or phantom limb pain. Research supports the co-existence of stump pain in up to 80% of

cases of phantom limb pain, and this pain frequently causes the amputee to be disabled (Nikolajsen et al., 1997).

Long-term disability, due to stump pain and phantom limb pain, appears in a large percentage of amputees (5-80%, depending upon the population sampled) (Flor, 2002; Sherman, Sherman, & Parker, 1984). These numbers are significant given the current number of amputees, the relative lack of effective treatments for their pain, and the human and economic cost of their resultant disability. About half of the population of amputees has their pain subside as the acute phase of their injury resolves (Kiefer et al., 2002). However, for a select percentage of amputees the pain is so persistent, uncomfortable, gnawing, and unbearable that they are unable to tolerate wearing a prosthetic device, which makes mobility more difficult. Those in such pain are also more likely to experience depression and isolation (Sherman et al., 1987; Whyte & Niven, 2001).

### *Pain Measurement*

One way that the pain is frequently measured in hospitals and clinics is using a Numerical Rating Scale (NRS) or the Visual Analog Scale (VAS). The NRS is a scale from 0 to 10 or 0 to some definitive number. Each number on the continuum represents pain moving from no pain at all (0) or pain as bad as it can get (10). The VAS is a self-report 10-centimeter line scale with each centimeter representing one point. Where 0 is no pain at all and 10 is the worst pain they have ever felt. The patient simply marks a slash on the line to represent where their pain is now. Turk and Melzack (2001) reported the NRS and the VAS can reliably be used with chronic pain patients and has

good construct validity. The two scales can be used together by placing the continuum on a line and labeling each point on the line. The person then reports what number represents their pain intensity level. Research on the effects of amputation pain showed that pain intensity above a 5 (moderate) on a VAS significantly interferes with daily activities (Jensen, Smith, Ehde, & Robinsin, 2001). Many amputees suffer from significant chronic pain above a 5, which leads to significantly higher unemployment rates (18%) and the inability to function on a daily basis (Huse, Larbig, Flor, & Birbaumer, 2001). Jensen et al. (2001) found that amputees became capable of completing activities of daily living when their pain intensity was rated below a 5. They stated that effective treatments are needed that will reduce pain from the moderate or severe intensity range down into the mild range instead of solely focusing on treatments to completely eliminate pain.

#### *Limited Treatments for Pain*

Surprisingly, despite the long documented history of amputations dating back to antiquity (Griend, 2001), relatively few effective treatments are available for residual stump pain or phantom limb pain (Halbert, Crotty, & Cameron, 2002). Research on treatments of amputation-related pain has focused on pharmacologic treatments such as Neurontin and opioids (Huse et al., 2001), dorsal root lesions that sever specific nerves in the spine, nerve blocks such as epidural steroid injection or perineural / intraneural bupivacaine injection, neurostimulation methods such as Transcutaneous Electrical Nerve Stimulation (TENS) and prosthetic myoelectric stimulation (Halbert et al., 2002), and counseling, all of which have proven to be of limited value for pain

management over the long term (Flor, 2002; Muraoka, Komiyama, Hosoi, Mine, & Kubo, 1996; Parkes, 1973; Whyte, & Niven, 2001).

### *Hypnosis*

One treatment for pain that is frequently cited as effective is hypnosis. However, the available research on the use of hypnosis to treat phantom limb pain is unfortunately limited mainly to case studies (McGarry, 1993; Oakley & Halligan, 2002; Oakley, Whitman, & Halligan, 2002; Sthalekar, 1993). The case studies utilizing hypnosis show that hypnosis may have the ability to reduce the intensity of phantom limb pain to manageable levels thereby offering the individual more functionality in their daily life. Explicitly, hypnosis has the potential of reducing pain-rating scores below the moderate level (McGarry, 1993, Oakley & Halligan, 2002; Oakley, Whitman, Halligan, 2002; Sthalekar, 1993). It is difficult to generalize from such case studies to the general population, but these studies offer promise for the utilization of hypnosis for the treatment of residual stump pain and phantom limb pain.

There have been a few controlled studies of hypnosis in residual stump pain and phantom limb pain. For example, Cedercreutz and Uusitalo (1967) used hypnosis to alleviate pain in 37 amputees. Follow-up at 1 and 8 years revealed that 20 participants were pain free and 10 others were significantly improved. Other controlled studies suggest that relaxation and biofeedback are also effective in treating residual stump pain and phantom limb pain (Belleggia & Birbaumer, 2001; Levine, 1990; Sherman, Gall, & Gormly, 1979). As will be discussed at length in chapter 2, these studies appear to show that hypnosis is an effective intervention for residual stump pain and phantom

limb pain, and appears to have lasting positive effects. Thus, numerous studies suggest that hypnosis is effective as a primary or adjunctive treatment for acute or chronic pain (Barber, 1996; Hilgard & Hilgard, 1975; Holroyd, 1996; Lynch, 1999; Montgomery, DuHamel, & Redd, 2000).

### *Theoretical Bases*

The theoretical foundation for this dissertation research is based upon two related fields of research that have been studied extensively, but independently from each other. These fields of research include pain or more specifically phantom limb pain and hypnosis. The study is conceptualized within a neo-dissociation theoretical conceptualization (Barabasz, 1982, 1984), which is based upon E. R. Hilgard's (1977) neo-dissociation theory of hypnosis.

The neodissociation theory of divided consciousness puts forth that a person in hypnosis has a division of awareness such that the individual is unaware of things they normally would be such as pain while maintaining an awareness of other processes. This is hierarchical in nature and involves an executive monitoring system with subsystems. Under hypnosis, a person can be disconnected from different subsystems producing dissociation of incoming information from consciousness through the amnesic barrier and assumes complete involvement by the individual (Barabasz & Watkins, 2005). Hypnotic analgesia then is due to the person's experience being altered. This is a dissociation of the pain signals from their dominant awareness to a subordinate system (Kihlstrom, 1998). Barabasz and Watkins (2005) report that individuals are able

to maintain control by continuing to make decisions such as staying in hypnosis, rejecting suggestions, substituting suggestions during hypnosis.

There are many theories regarding residual stump pain and phantom limb pain, such as the Psychological, Peripheral Processing, the Central Processing, Cortical Reorganization, and the Somatosensory Pain Memory theory. None of these theories completely explains all of the issues related to residual stump and phantom limb pain. The Gate Control Theory of Pain by Melzack and Wall (1965) has been the leading theory on pain since its inception. In fact, each of the models listed above utilizes the Gate Control Theory as the foundation upon which the theory is built. It seems only natural that this research would also use the Gate Control Theory as a starting point.

The Gate Control Theory proposes that once an injury occurs, the pain signals are detected by the peripheral nerve system. The pain message follows the peripheral nerves to the spinal cord and then up to the brain. When the message arrives in the spinal cord, the signal encounters nerve gates in the spinal cord that open or close. When the gates are open, the pain signals travel freely and can be quite intense. When the gates close, the messages are stopped from reaching the brain and are not perceived by the individual. The open gates send signals to the brain as quickly as possible in order to stop any further damage from occurring to the individual using small, conductive, fibers called A-delta (myelinated) nerve fibers that travel at 40 mph. The signals responsible for closing the gates are called C-fibers (unmyelinated), which are slow and continuous and send signals at 3 mph to the brain. Pain is a combination of the equilibrium between the information traveling into the spinal cord through C-fibers and information traveling into the spinal cord through A-delta nerve fibers. When C-

fibers have more activity the pain should be minimal, compared to when all of the signals are traveling on the A-delta fibers. Barabasz and Watkins (2005) describe the two pathways as the sensory-discriminative system and the motivational-affective system. The sensory-discriminative system manages the location and severity of the pain while the motivational-affective system is concerned with the suffering component of pain.

The brain responds to the signals sent from the C-fibers by releasing chemicals or hormones called endorphins, which reduce or inhibit the painful sensations that are perceived. Thus, the gate may be influenced by the peripheral response to the pain and higher brain activity such as cognition and emotion. The perception of the pain can be altered by the individual's way of viewing the situation and/or their mental state at the time (Katz & Melzack, 1990).

Barabasz and Watkins (2005) report that through hypnosis it is possible to disrupt the sensory-discriminative signals while still permitting the signals from the motivational-affective system to pass. This would lessen the suffering component of pain without greatly interfering with the normal pain system.

Despite the lack of research supporting hypnosis as a valid treatment for residual stump pain and phantom limb pain, there are several areas within the Gate Control Theory that would lead one to believe hypnosis would be a successful treatment for these chronic problems. First, hypnosis is known to be useful for diminishing a myriad of pain problems. Further, hypnosis may help to relieve pain by facilitating the release of beta-endorphins within the brain (de Beer, Fourie, & Niehaus, 1986; Domangue Margolis, Lieberman, & Kaji, 1985). Lastly, several research studies have been



conducted using differing levels of hypnotizability to determine how cold-pressor pain is experienced while participants are in hypnosis compared to the controls or normal state (Farthing, William, Venturino, Brown, & Lazar, 1997; Freeman, Barabasz, Barabasz, & Warner, 2000). Results showed that in hypnosis, the participants were able to keep their arm immersed in the water much longer than when they were not hypnotized or than controls. Participants also perceived the suffering as minimal while in the hypnotic condition. The participants were aware that their arm was immersed, they had a perception of it, but they were not bothered by it. Also noted was the participants perception of what was occurring was changed (Farthing et al., 1997). In a study by Spiegel (2003), it was noted that hypnosis altered perceptual and attentional functions within the brain. This shows how hypnosis is capable of changing an individual's perception of an experience. Being able to change their experience of their pain slightly, may prove to have a large impact on participants' lives.

Pain is known to have several components, which Melzack and Wall (1975) have incorporated into the McGill Pain Questionnaire (MPQ). The MPQ, as explained at length in Chapter 3, has 79 descriptor words that are broken into the four main subcomponents of pain. Sensory aspects of pain are the physiological reminders that there is a problem and include descriptors such as throbbing, pounding, shooting, stabbing, cutting, pinching, burning, tingling, dull, heavy, and splitting (Turk & Melzack, 2001). The affective components of pain are considered the suffering components and Barabasz and Watkins (2005) elucidate that the suffering can be the cause of "immobilizing depression" for the individual. The evaluative component is how someone perceives his or her pain. Lastly, the fourth subcomponent is miscellaneous.

### *Hypnotic Techniques*

As was stated previously, there are limited treatments available that are effective for residual stump pain and phantom limb pain. Crasilneck (1995) affirms the use of hypnosis with pain patients and recommends utilizing multiple techniques as a way to alleviate the pain. Crasilneck is known for the bombardment technique where the therapist tries a variety of hypnotic techniques until one or more are found to work with the individual. Age regression is one of the methods used. It is considered effective because individuals can be regressed to the period prior to the onset of their pain. When the individual is able to bring this pain free state forward to the present they usually find their chronic pain subsides over time or is alleviated. Further, this technique offers individuals the feeling of psychological control over their pain and can have considerable impact on the pain state (Crasilneck, 1995). Wain (1992) adds that hypnosis will give the individual control over their pain as well as decrease anxiety and fear associated with issues related to their pain and amputation. In a study that utilized age regression, approximately 95% of the participants were able to be partially or completely involved in the hypnotic age regression (McConkey, Bryant, Bibb, & Kihlstrom, 1991), as measured by the Harvard Group Scale of Hypnotic Susceptibility: Form A (Weitzenhoffer & Hilgard, 1959).

Barabasz and Watkins (2005) cite numerous studies that have utilized many different approaches in the use of hypnosis for a multitude of pain problems. One approach is the dial method. McConkey, Wende, Barnier (1999) use an actual physical dial with research participants to measure their subjective experience in hypnosis. The dial assists in indicating how well they were able to experience a hypnotic suggestion.

This same technique can be used as a hypnotic suggestion to reduce pain. The individual is asked to imagine their hand on a dimmer switch or some other appropriate metaphor for a dial and see their pain diminishing with each turn. Hilgard and Hilgard (1975) had participants immerse their hand in a bucket of ice water to numb the pain. Other common techniques include distraction, dissociation, glove anesthesia, displacement, metaphors, time distortion, reframing, and analgesia. McCarthy (1999) has trained over 600 pregnant women using a combination of techniques including metaphors, reframing, and dissociative techniques to control the pain of labor. A recent review of the literature found hypno-analgesia to reduce ratings in pain significantly as well as contribute to the reduction in need for analgesics, nausea and vomiting, and length of stay in hospitals (Patterson & Jensen, 2003).

Following this line of thinking, this study will use individualized, tailored, hypnosis sessions in order to utilize the participant's unique skills to the fullest. This may or may not include age regression. As can be seen from the different hypnotizability scales, not all participants can pass the more difficult items such as the age regression, but may still benefit from other techniques. Using a variety of hypnosis techniques will ensure that the individual is able to comfortably tap into their hypnotic capacity and use it to the fullest to receive pain relief.

The current study employed multiple types of standardized hypnotic procedures in order to fit the needs of the individual participant. These included glove analgesia, transferring pain to less aversive areas, the dial method, metaphors, posthypnotic suggestions for continued pain relief, dissociation, and self-hypnosis training. As the literature review will show, previous findings show hypnosis to be efficacious in the

treatment of multiple types of pain problems. The use of tailored hypnosis more closely resembles an actual clinical and rehabilitation setting that amputees may be involved in.

In order for hypnosis to be effective, participants must be fully engaged in the process. This requires that they trust the clinician, feel comfortable and have rapport, and are able to adequately reach their full potential. Hypnosis is only as good as the depth that is achieved during the session. Because the residual stump and phantom limb pain is so intense and chronic, it was important for the participants to be fully engaged in the experience of hypnosis. Barabasz (2003) reported that participants could be highly hypnotizable and score very high on the Stanford Hypnotic Clinical Scale (SHCS; Morgan & Hilgard, 1979), but not reach their full potential during the hypnotic induction. For example, the person may be highly hypnotizable and score a 5 on the SHCS, but not actually reach a 5 on the day of the treatment. Perhaps they do not feel good and only obtain a 3 on the scale. Thus, incorporating a depth measure into the induction ensured that participants capable of deeper levels of hypnosis had the opportunity to reach those levels. Diamond and Howe (2001) stated that it is often unclear whether negative outcomes are due to the patient's never achieving a hypnotic state, or because the treatment was ineffective. Further, research supports the use of hypnotic susceptibility scales as a valid and reliable measure of hypnotic ability (McConkey, Sheehan, & White, 1979; Sapp & Evanow, 1998).

### *Statement of the Problem*

Given the prevalence of stump pain and phantom limb pain and the disability frequently associated with it, it is important to develop effective treatments. However, the review of the literature clearly reveals that few effective treatments have been found. Melzack and Wall's (1965) Gate Control Theory of Pain suggests that residual stump pain and phantom limb pain can be potentially modulated by other factors such as hypnosis. Therefore, because hypnosis is known to be efficacious in treating multiple types of chronic pain it is assumed that it will be helpful in treating residual stump pain and phantom limb pain. Chaves (1986) reported that dramatic results using hypnosis for phantom limb pain could be seen as quickly as three sessions. Other studies have shown results in periods ranging from one session to as many as eight weeks. Therefore, the current study investigated the effectiveness of three individualized, tailored, hypnosis sessions in the treatment of residual stump pain and phantom limb pain.

The problems addressed in this study were important for a number of reasons. First, there are thousands of amputees suffering from uncontrolled residual stump and phantom limb pain with approximately only 7% of amputees finding any relief with available treatments (Katz & Melzack, 1990). The use of hypnosis has proven to be effective with chronic pain and be effective with residual stump and phantom limb pain, but needs to be investigated further. Second, it had the potential to make a unique contribution to the literature, since only a few studies to date have utilized hypnosis with more than a few participants. This study solidifies the literature from which

generalizations are made. Third, hypnosis offers a potentially time-efficient means of helping amputees decrease the suffering from chronic pain to a tolerable intensity.

This research adds to the available literature on treatment options for residual stump and phantom limb pain. Because of the magnitude of treatment failures for these conditions, it is imperative to look at expanding the knowledge in areas that have shown promise through previous research, such as hypnosis. Further, given the amount of time that amputees are in hospital settings as part of their rehabilitation, having a treatment option that is versatile and works individually and in-group settings may be of substantial value.

### *Definitions of Terms*

The design of this study requires an understanding of a number of concepts, which through the years have been interpreted various ways depending on the user's theoretical orientation or the researcher's purpose. Thus, to clarify any confusion the terms are outlined below for use within this dissertation research.

*Acute Pain.* This is the initial pain that is felt following an injury, illness, or surgery. This can be the pain around the wound from an incision. The pain will generally subside when the area heals within three months.

*Afferent.* Conveying impulses toward a nerve center such as the brain or spinal cord (Merriam-Webster, 1995).

*Bone Spurs.* A sharp and boney outgrowth often found on the end of the stump (Merriam-Webster, 1995).

*Brain Reorganization/Remapping.* When areas of the brain representing the amputated (deafferented) body part undergoes sensory and motor reorganization from other areas of the brain, which represent additional, intact, areas of the body (Oakley and Halligan, 2002).

*Bursa.* A small fluid filled sac between the tendon and the bone. Often found on shoulders, hips, elbows, and buttocks (Merriam-Webster, 1995).

*Bursitis.* Certain areas of the body have significant stress and tend to wear down the bursa more quickly resulting in inflammation of the bursa, which often causes significant pain (Merriam-Webster, 1995). Use of a prosthetic may contribute to the bursitis seen among amputees.

*Chronic Pain.* Pain in any area of the body that continues for more than the time required to heal from the acute injury. For the purposes of this research, the timeframe was six months post-amputation.

*Cordotomy.* The surgical division of a tract of the spinal cord for relief of severe intractable pain (Merriam-Webster, 1995).

*Deafferentation.* The severing of sensory nerves (Oakley & Halligan, 2002).

*Frozen Phantom Limb.* When the amputee perceives their absent limb as being stuck in a certain position and they are unable to move the limb.

*Hypnosis.* Spiegel and Spiegel (2004, p. 19) define hypnosis as the ability to "...sustain a state of attentive, receptive, intense focal concentration with diminished peripheral awareness in response to a signal... There are three main components of hypnosis: absorption, dissociation, and suggestibility... Focal attention necessitates the elimination of distracting or irrelevant stimuli... The hypnotized person is not asleep, but awake and alert."

APA's Division 30 has recently updated their definition as follows: "The hypnotic situation typically involves a preamble to the procedure during which the subject is told that the nature of what is to follow involves suggestions for imaginative experiences. The imaginative suggestions are then administered. What is typically referred to as an induction is merely an extended introductory suggestion which might (or might not) contain further elaborations of the preamble. Using the word "hypnosis" as part of the hypnotic situation may be helpful, but is not necessary for the induction of hypnosis.

A hypnotic procedure is a protocol used to establish a hypnotic situation [a



state of hypnosis] and evaluate responses to [hypnotic] suggestions. In such situations, one person (the subject) is guided by another (the hypnotist) to respond to [hypnotic] suggestions for alterations in perception, thought, action. Persons can learn self-hypnosis, which involves administering hypnotic procedures to themselves. If the constellation of responses to standardized suggestions satisfies a criterion, it is generally inferred that hypnosis has been induced. Hypnotic responses are those responses and experiences characteristic of the hypnotic state.

The particulars will differ depending on the framework of the investigator or practitioner and the purposes of the procedure. Procedures typically involve instructions to relax (or become alert) and suggestions that permit the extent of hypnosis to be calibrated by comparing their responses on standardized scales. Responsiveness of the individuals may range from high to negligible. Criteria are usually established for clinical and research purposes based on high, medium, or low scores. As is the case for states such as attention and awareness, the salience of the evidence for having achieved hypnosis increases with the individual's score (Montgomery et al., 2003).”

*Hypnotizability.* Hypnotizability was measured using the Stanford Hypnotic Clinical Scale. Participants were considered as low hypnotizable when they scored from 0-1. Scores of 2-3 qualified as average hypnotizable and scores of 4-5 as potentially highly hypnotizable. It is the capacity that an individual has to experience hypnosis.

*Hypnotic Depth.* Hypnotic depth is the degree to which an individual can experience hypnosis. Araoz (1982) notes that the depth depends on how involved a person is with his/her own imagining.

*Intraneural.* The space or area within a bundle of nerves.

*Neuroma.* A tumor or mass growing from the nerve or nerve fibers. A mass of nerve tissue in an amputated stump resulting from abnormal regrowth of the stumps severed nerves (Merriam-Webster, 1995).

*Neuropathy.* A degenerative state of the nervous system or nerves, which often results from diabetes complications. The limbs may lose sensation resulting in more injuries and amputation.

*Nerve Block.* The block is usually a chemical injected around or into the nerve bundle. Nerve blocks are used to deaden the signals that the nerves send. For phantom limb pain and residual stump pain, the nerve blocks frequently work for a brief period of time (Halbert et al., 2002).

*Pain.* Pain is associated with suffering and can be mild to severe. It is usually the result of disease or injury. It is a sensation brought on by noxious stimuli, received by nerve endings, and usually leads the person to avoid, escape, or change what they are doing.

*Pain Intensity.* Pain intensity is the amount of pain that a participant is experiencing at any given moment. The intensity is known to fluctuate over time and with certain activities. The worse the pain gets the more disabled a person becomes. This is associated with how mild or severe the pain is perceived to be. Subcomponents of pain are sensory, affective, and evaluative. Suffering is considered the worst part of

pain and the piece that medications and treatments generally target. Descriptions of words that make up pain intensity include words like unrelenting, throbbing, stabbing, and deep. This is frequently measured on a numerical rating scale.

Pain intensity was measured using two scales. The McGill Pain Questionnaire was designed to give a quantitative measurement to the pain experience (Melzack, 1975). For the purposes of this research, pain intensity was measured using the Pain Rating Index, which is based on numerical values that each word is assigned from 1 to 5. The rank values of all of the words chosen were given a sum total score. The Number of Chosen Words were also examined as a way of tracking the pain intensity.

The other way that pain intensity was measured was using the Numerical Rating Scale, which goes from 0 to 100. This was used in several ways. First, participants rated the pain intensity using the Daily Pain Rating Scale (DPRS). The measure was used to record baseline pain intensity for the week prior to the start of the study. Participants were asked to record pain intensity for an additional three weeks as a way of tracking the pain. The Prehypnotic Pain Scale and the Posthypnotic Pain Rating Scale were used with the treatment group only. These scales are the same and simply ask participants to rate present pain intensity from 0 to 100.

*Perineural.* The space close to or next to the nerves in the body.

*Phantom Limb Pain.* Is a painful sensation in the missing limb (Halbert et al., 2002). The painful sensations can be accompanied by a sense that the limb is twisted and getting longer or shorter (telescoping).

*Pharmacologic Treatments.* Treatments that are medication related and can be from a number of classes of drugs such as antidepressants, anticonvulsants, opioids,

barbiturates, neuroleptics, and muscle relaxants. Most pharmacologic treatments reduce chronic pain slightly and are more effective for acute pain (Flor, 2002; Huse et al., 2001).

*Prosthetic Myoelectric Device.* The prosthetic device is equipped with a TENS unit that stimulates the nerves on the stump. This relatively new device slows, down the reorganization that occurs in the brain and decreases the incidence of phantom limb pain (Flor, 2002).

*Stump Pain.* The residual stump is what is left of the leg following amputation. The amputation can be below the knee, so from below the knee up toward the hip would be considered the stump. The amputation can also be above the knee.

*Suggestibility.* This refers “to the capacity of the individual to respond to suggestions... Suggestion is what you say to your patient, and the way in which you say it” (Weitzenhoffer, 1980, p. 133).

*Telescoping.* The shrinking of the phantom limb into the stump with only a hand or foot remaining (Melzack, 1971). Frequently, it is the phantom hand or the phantom foot that is left remaining attached to the residual stump.

*Transcutaneous Electrical Nerve Stimulation (TENS).* Electrodes are placed on the skin and electric current applied at different pulse rates (frequencies) and intensities are used to stimulate these areas so as to provide pain relief (Halbert et al., 2002).

TENS currently is one of the most commonly used forms of electroanalgesia.*Residual*

*Residual Stump and Phantom Limb Pain.* The mechanism for both stump and phantom pain are unknown at this point. Thus, the vast literature on the subject puts stump and phantom pain together since they most frequently occur together and less

commonly occur separately. Very few research articles address the two types of pain separately. So for the purposes of this research, residual stump and phantom limb pain were considered together.

*Rhizotomy.* The operation of cutting the anterior or posterior spinal nerve roots (Merriam-Webster, 1995).

The following hypotheses were generated on the bases of the theories presented and the literature reviewed:

### *Hypotheses*

*Hypothesis 1.* Participants in the hypnosis treatment group will show significantly lower Pain Rating Intensity at time 2 (posttest) compared to time 1 (pretest) as measured by the McGill Pain Questionnaire.

*Hypothesis 1b.* Participants in the hypnosis treatment group will show significantly lower Pain Rating Intensity at time 2 (posttest) as measured by the McGill Pain Questionnaire when compared against the waitlist control group at posttest.

*Hypothesis 2.* Participants in the hypnosis treatment group will show significantly fewer Number of Chosen Words (NCW) at time 2 (posttest) on the McGill Pain Questionnaire.

*Hypothesis 2b.* Participants in the hypnosis treatment group will show significantly fewer Number of Chosen Words (NCW) at time 2 (posttest) on the McGill Pain Questionnaire when compared with the waitlist control group at posttest.

*Hypothesis 3.* Participants in the hypnosis treatment group will show significantly lower pain ratings on the McGill Pain Questionnaire Present Pain Intensity (PPI) subscale at time 2 (posttest) compared to time 1 (pretest).

*Hypothesis 3b.* Participants in the hypnosis treatment group compared with the waitlist control group, will show significantly lower pain ratings on the McGill Pain Questionnaire Present Pain Intensity (PPI) subscale at time 2 (posttest) compared to time 1 (pretest).

*Hypothesis 4.* Participants in the hypnosis treatment group will show significantly lower mean scores at time 2 (last recorded week) compared to time 1 (week 1) as recorded on the Daily Pain Rating Scale.

*Hypothesis 4b.* Participants in the hypnosis treatment group will show significantly lower mean scores at time 2 (last recorded week) compared to time 1 (week 1) as recorded on the Daily Pain Rating Scale (DPRS) when compared against the waitlist control group scores at posttest.

*Hypothesis 5.* Participants in the hypnosis treatment group will show significantly lower scores on the Posthypnotic Pain Rating Scale than the Prehypnotic Pain Scale at each session.

## CHAPTER TWO

### LITERATURE REVIEW

The amputation of limbs has been described for centuries. In 484 BC, Hegistratus, a Spartan prisoner of war, was forced to amputate his own foot, and made a prosthetic foot out of wood in order to escape (Griend, 2001). His attempt failed, and he was caught and later beheaded. Griend (2001) reported a thorough history of amputations due to warfare during the Greek and Roman era, with most amputee soldiers dying due to infection. In World War I, there were approximately 4,400 surviving amputees, and in World War II, there were greater than 45,000. Following both world wars, the medical community examined its successes and failures with amputation, and the American Orthotics and Prosthetics Association was formed in 1970 to advance the treatment of patients following amputation.

Currently there are standardized treatment protocols for surgery, rehabilitation, and outpatient care for amputees. There are now technologically sophisticated prosthetics and motorized wheelchairs. However, the field has not progressed to a point of complete understanding and agreement on the issues surrounding amputation. Many problems that researchers have struggled with for years continue on, and will likely do so for years to come. One such controversy is the causal mechanisms responsible for residual stump pain and phantom limb pain.

There have been a number of models suggested to describe these mechanisms, beginning as early as 1872, when the term 'phantom limb' was coined by Silas Wier-Mitchell (Ramachandran & Rogers-Ramachandran, 1996). The five generally accepted



theories in the residual stump and phantom pain research will be reviewed followed by the main theory on pain. An overview of the use of hypnosis for pain will be examined, followed by a description of specific research on hypnosis, relaxation, and biofeedback for treating phantom limb pain.

### *Phantom Limb Theories*

#### *Psychological Theory*

This is one of the original models purported to account for phantom limb pain. Coming from the psychoanalytic perspective, researchers believed that phantom limb sensations and pain were an unconscious response to grieving the loss of the limb (Flor, 2002). The pain was thought to represent the person's inability to cope with the amputation. It has also been suggested that it is the person's need to deny the affect connected to the loss, rather than the actual loss of the limb (Postone, 1987). Melzack (1971) reported that emotional problems often contribute to the pain, but are not the causal factor, since some amputees obtain relief from nerve blocks. Flor (2002) reported that psychological factors do not contribute to the cause of phantom limb pain, but certainly can affect its course and severity. Sherman, Arena, Sherman, and Ernst (1989) found a relationship between stress and the onset and exacerbation of phantom limb pain. Melzack (1990), a leading researcher on phantom limb pain and chronic pain, reported that amputees with phantom limb pain are psychologically similar to those not reporting phantom pain. The amputees with phantom limb pain are also very similar psychologically to individuals experiencing chronic pain. Melzack (1987) reported that finding greater psychological disturbance in phantom pain patients might

be confounded, since the population sampled in some supportive studies came primarily from mental health centers. When personality factors were examined, rigidity and compulsive self-reliance were commonly associated with phantom limb pain (Parkes 1973). Individuals with a rigid personality style were thought to have difficulty dealing with change and consequences resulting from amputation. Individuals with compulsive self-reliance are viewed as having difficulty relying on others for their needs following amputation, which leads to significant distress and ultimately phantom pain (Whyte & Niven, 2001a). Unemployment was also associated with more severe pain when the amputees were out of work one year post amputation. Another interesting finding is that many amputees may not tell their physicians they are experiencing phantom limb pain for a number of psychologically related reasons, such as fear they will be viewed less favorably (Flor, 2002; Melzack, 1990; Parkes, 1973). Interestingly, Whyte and Niven (2001a) suggest that because the success rate for treatments for phantom limb pain is so low, all but the most “self-reliant” individuals would be deterred from continuing to insist on treatment for their pain.

Treatments that are related to the psychological model of phantom pain include counseling for pain, depression, anxiety, or other factors commonly related to chronic pain (Eimer & Freeman, 1998). Education around pain related issues is frequently used to teach patients what types of things contribute to their pain that can be changed (Turk & Melzack, 2001). Pharmacological treatments such as antidepressants, anticonvulsants, barbiturates, anxiolytics, and benzodiazepines are only partially helpful (Jones, 2000) and usually help most during the acute phase following amputation.

### *Peripheral Processing Theory*

This theory attempts to explain the etiology of phantom limb pain based on the neural functioning in the peripheral limbs. It is posited that there are abnormal discharges originating from the dorsal horn of the spinal cord that are caused by a loss of afferent input from the amputated limb (Rosen, Willoch, Bartenstein, Berner, & Rosjo, 2001). Davis (1993) reported discharges from nerve sprouts (nerves that are branching off and connecting to muscle tissue) on the residual stump that may significantly contribute to the sensation of pain. Phantom pain is also shown to be relieved for a short time by saline injections into the stump or interspinous tissue (Dougherty, 1980), which may have contributed to this theory's sustained support. It is also thought that problems arising in the stump, such as neuromas, bursas, or a poorly healed suture area can contribute to the pain. This is due to the skin and/or muscles rubbing and becoming irritated from the problems with the stump over time (Ramachandran & Rogers-Ramachandran, 1996). Postone (1987) describes phantom limb pain as persistent sensations of the nerve endings in the stump. The muscles cause the nerves to become innervated and send incorrect signals to the brain, which are interpreted as pain in the phantom. The amputee may experience the sensations as cramping, spasms, jumping, tingling, or burning (Sherman, 1994a, 1994b). There is substantial evidence to support stump pain being associated with phantom limb pain. However, when the neuromas, bursa, bone fragments, or scar tissues are removed, the phantom limb pain commonly persists (Postone, 1987).

Treatments arising from this model include pharmacological treatments such as opioids, antidepressants, anticonvulsants, muscle relaxants, and neuroleptics (Muraoka

et al., 1996). Uses of analgesic injections into the stump are common along with additional surgeries to remove the problems found on the stump. Postone (1987) described electrical irritants (prosthetic myoelectric devices or TENS) as exacerbating the phantom pain, but local anesthetics may eliminate it.

### *Central Processing*

The central theme of the Central Processing theory is that the phantom limb pain is related to abnormal spinal activity (Melzack, 1971). This theory originated with W. K Livingston (1943), who proposed that damage to the limb created abnormal firing patterns in the closed, self-exciting neuronal loops within the spinal cord (As cited in Melzack, 1971). These excited neurons send a surge of nerve impulses to the brain that ultimately gives rise to pain. This pain can then spread to adjacent neurons in the lateral and ventral horns to produce autonomic and muscular manifestations in the stump. The amputee may experience this as pain, sweating, or jerking of the residual stump. The stump then creates more excitation, which creates a neuronal loop of activity (Melzack, 1971). Flor (2002) reported that during spinal anesthesia phantom pains were reported by patients who had never experienced phantom pain before. The process was referred to as 'central sensitization.' There may be increased excitability of the dorsal horn neurons and inhibition of the inhibitory processes. Structural changes have also been noted at central nerve endings. Kiefer et al. (2002) believes that the sensitization process is mediated by the N-methyl-D-aspartate (NMDA) receptors, which play an important role in chronic pain states. This research used NMDA-antagonists over 4-weeks with two amputees and brachial plexus analgesia respectively for 5 and 9

days. The results showed that both participants were pain free at the 12-month follow up.

Treatments available based on this model include nerve blocks such as the epidural steroid injection or the perineural or intraneural bupivacaine injection, dorsal horn lesions, cordotomy, rhizotomy, and pharmacological treatments (Oakley, Whitman, et al., 2002; Sthalekar, 1993).

### *Cortical Reorganization*

This is derived from the model of the homunculus in the somatosensory cortex. The homunculus (little man) represents the area of the brain that represents each body part, as well as the amount of space that each body part requires in the somatosensory cortex. Areas of the body that require more touch receptors or sensory input such as the lips have a larger area designated for them within the brain (Thompson, 1985). When an area of the body is amputated or the sensory nerves are severed, the brain is still intact. Yet the impulses that were being sent from the peripheral limb are not being sent, and the respective area of the brain is thought to decrease in size or atrophy. The adjoining areas in the brain are believed to take over the space. As they begin to take over, they activate and send signals to the phantom limb (Oakley & Halligan, 2002; Thompson, 1985). Some of the pioneering work in this area was done using primates (Merzenich, Nelson, Stryker, Cynader, Schoppmann, & Zook, 1984; Pons, Garraghty, and Mishkin, 1988). These studies on primates showed that following deafferentation, large areas of the brain underwent both sensory and motor reorganization. Oakley and Halligan (2002) reported that remapping of the brain could occur as quickly as 24 hours

after amputation. Incidentally, phantom limb pain is often felt within the first week following amputation with many reporting it the same day as the amputation. The cortical remapping is further supported by neuroimaging (PET, functional MRI) which shows that phantom limb pain is simultaneous with activity in the represented brain areas (Ersland et al., 1996; Oakley et al., 2002). Flor (2002) reported that telescoping is reported in approximately 30% of amputees, and is associated with more rather than less phantom limb pain in studies using neuroimaging. Telescoping is a sign of more cortical reorganization. Since the hand or the foot has more sensory receptors, they may be represented differently based on the homunculus model of the brain.

Ramachandran and Rogers-Ramachandran (1996) did some very interesting research using a mirror box with arm amputees. The amputees placed their intact arm into the box and the mirror created a reflection of their absent or phantom limb. When the individuals moved their intact hand/arms, the phantom was able to move. Most participants reported intense feelings accompanied by an unlocking of a “frozen” phantom limb. Pain also decreased or was gone until they removed their intact arms from the box. Out of 10 participants, paralysis remained in one, and pain remained in another. These researchers also noted that cortical organization must have occurred because when they touched participant’s faces the phantom became activated. This showed that the brain had rewired and the area that once was the amputated limb was now taken over by the neurons from the face. Phantom limb pain is believed to be due to the neurons moving into the area occupied by the absent limb. This cortical reorganization activates the neurons and sends the individual signals that the limb is still present, and possibly that it are still in pain.

The myoelectric prosthetic is a treatment that is based on this model. It is purported that the stimulation of the stump created by the electrical impulse within the prosthetic will assist in slowing down or stopping the reorganization of the brain. This in turn will decrease the pain and minimize the phantom sensations (Flor, 2002). There is limited available evidence at this point to support this hypothesis.

### *Somatosensory Pain Memory Model*

This model can be termed a “multicausal theory.” It takes into account the multiple factors that control pain within the body and the mechanisms posited by the other theories. Sherman (1989) reported that pain comprises multiple symptom classes rather than a unitary syndrome. This statement is further backed up by the author’s research looking at two types of phantom limb pain. One included decreased blood flow to the stump, which has more thermal qualities (relating to the temperature of the stump). This is commonly described by amputees as burning or tingling and more often seen in diabetics. The other type is described as cramping pain, and is often associated with spike activity on an electromyography (EMG).

The somatosensory memory model takes into account the pain experienced in the intact limb before the amputation. Hill (1999) reports that amputees experience phantom pain similar in quality and location to that before the amputation. For instance, the pain may be similar to the wound being dressed, deep tissue injuries, the burning/tingling feeling from neuropathy, an ingrown toe nail, arthritis pain, or even the paralysis experienced prior to amputation. It has even been reported that previous injuries from years before can recur in the phantom limb (Sherman, 1994b). One study

reported as many as 74% of participants had pain similar to their pre-amputation pain (Jensen, Krebs, Nielson, & Rasmussen, 1985). Katz and Melzack (1990) reported that 42% of their sample had somatosensory pain memories that resembled both quality and location of pre-amputation pain. Ramachandran and Rogers-Ramachandran (1996) tested this theory using the mirror box as reported earlier. They believed that participants needed to receive a visual feedback signal that the amputated arm was present and moving. Participants (N = 10) placed their intact arm into a mirrored box, which through reflection, looked as though the participant had two intact arms. Within moments, the 'frozen phantom limb' would become unstuck and/or the pain would disappear in most of the participants. The results were dramatic. However, once the box was removed the paralysis returned along with the pain. The authors posit that the mirror box stops the error feedback loop by adding in visual feedback commands, which change the message received by the brain (thalamus, motor cortex, premotor cortex). Additional evidence for this model includes the low prevalence of phantom limb pain found in war veterans who have lost a limb suddenly (Melzack, 1971). Kiefer et al. (2002) discusses the role of pain sensitization and pain memory creation. It is reported that when a person undergoes a long period in pain that sensitization of nociception (pain) may have occurred prior to the amputation. N-methyl-D-aspartate (NMDA) receptors are thought to play a role in writing the pain memories. Using a limited sample, they used NMDA-receptor antagonists to stop the sensitization process prior to amputation. They had positive results in their sample. Patients seem to do better and report less pain when their pain is controlled prior to their amputation.



### *Gate Control Theory of Pain (GCT)*

This theory originated in 1965 from Melzack and Wall. It followed from and elaborated on both the Pattern Theory and the Specificity Theory of pain. This theory accounts for physiological processes as well as psychological processes in the pain experience.

In the GCT, the experience of pain depends upon the interplay of the central nervous system and the peripheral nervous system. Once an injury occurs, pain messages are sent from the site of injury following the peripheral nerves to the spinal cord and up to the brain centers. Prior to the messages reaching the brain, they arrive at the substantia gelatinosa in the spinal cord. The nerve gate or gating mechanism is located in this area. The gate opens or closes depending on the division of activity in the ascending and descending nerve fibers (Deardorff, 2003). An open gate allows the free flow of pain messages up to the brain. A closed gate prevents the further spread of these messages or tempers the signal. It is still unclear which exact mechanisms control the gates, but the theory proposes that the two main types of nerve fibers carrying messages are the A-delta and the C-fiber. For example, after a person hits their toe on something, the person begins the process of grabbing their toe and rubbing or holding it. This begins to activate other central sensory nerves that are faster than the A-delta or the C-fibers. The signal (pressure and touch) then reaches the brain to override some of the pain messages carried by the A-delta and C-fibers. The brain can then send signals down the spinal cord to open or close the gates. This can amplify the signal or diminish it. There are also summation effects based on the signals. This can mean that even something as small as a vibration can become a signal that is perceived

to be unbearable by the individual. Amputees frequently complain that their skin on their stump or other leg is sensitive to having their clothes rub on them. The summation effect also works to diminish the pain as well.

Deardorf (2003) describes the three main factors that may influence the signals. Sensory factors may block the signal include increased activity, relaxation training, meditation, and medication. Cognitive factors include coping strategies, outside interests, distraction, and positive thinking. Emotional factors include feeling reassured, sense of control, stress management, and positive attitude.

### *Hypnosis and Pain*

Despite pain being debilitating, annoying, feared, or aversive it is a necessary function of the body. Pain signals an individual to react in a certain way. Perhaps it is to move their hand quickly to avoid being burned. It may signal that one has been sitting or lying too long and a pressure sore is developing, but the only thing the person is aware of is the subtle message to change positions. Pain also tells the individual that healing is still occurring within the body, and they need to slow down or stop what they are doing. If the person with a broken arm did not feel pain, they may reach for things before their arm could handle the movement or the weight of the object.

Acute pain from a wound or a broken leg tends to be short in duration (0 – 3 months) and responds to a variety of treatments. In the case of chronic pain such as with cancer and burns, the treatment options become more limited and specific, as the pain becomes more stable and resistant to treatments over time.

Hypnosis is known to be an adjunctive therapy for the treatment of acute and chronic pain. Hilgard and Hilgard (1975, p. 68) stated, "There is no doubt whatever about the reality of pain reduction through hypnosis." It may even be viewed as superior to other methods because of its simplicity, versatility, and lack of chemicals. In 1996, the National Institute of Health (NIH) issued a report of their findings regarding treatments for chronic pain and insomnia. The report specifically states that relaxation and hypnosis are effective in reducing chronic pain (NIH, 1996).

The critical piece of hypnosis in the treatment of stump and phantom limb pain or any other type of pain is to alter the suffering component (Barabasz & Watkins, 2005). There are two main aspects to the pain experience, sensory and suffering (affective). If one is component (sensory or suffering) is changed, the whole experience of the pain has diminished. Sensory pain generally involves the more tangible aspects of the pain such as those described on the MPQ (pricking, boring, drilling, piercing). Whereas the affective piece is the part that makes a person not want to "fight the fight." On the MPQ, some of the words used are tiring, exhausting, sickening, and suffocating (Melzack & Wall, 1975). Thus, to change the amputee's experience of the pain they could be told to notice something interesting occurring that the piercing pain is shifting into something more like a pressure. The person is still cognizant of their pain, but not as bothered by it. This type of suggestion (diminishing the pain) is reportedly less disruptive to the physiological processes than eliminating the pain (Barabasz and Watkins, 2005). Further, eliminating the pain may require greater effort on the system as a whole rather than allow the pain impulses to be expressed in more tolerable forms such as tingling or numbness (Barabasz & Watkins, 2005).

Below is a review of the literature looking at hypnosis and pain control in acute and chronic pain.

### *Labor Pain*

Hypnosis is considered one of the natural ways for women to control the pain of labor. It is considered to be in the same class with the well-known Lamaze method for childbirth, which actually grew out of the Russians experience with hypnosis (Barber, 1996; Hilgard, 1986). Beyond just controlling pain, hypnosis can be used throughout the entire pregnancy. It has been shown to be helpful for hyperemesis gravidarum (excessive nausea and vomiting in early pregnancy) as well as speeding up the healing process following the birth. Rodger (1990) reported the advantages of hypnosis as being versatile, adaptable, reducing or eliminating sedating medications, and controlling anxiety. Pain can be controlled without interference to the physiology of the child and the partner is able to participate. Hypnosis has been found to significantly decrease the time involved in labor, the amount of anxiety experienced, and the overall discomfort (Barabasz & Watkins, 2005; Crasilneck & Hall, 1975; Oster, 1994). One, six-session randomized study had 4 groups of pregnant females (n=60). Two of the groups were treatment groups that received hypnosis and participants were either highly hypnotizable or were low hypnotizable. The other two groups were the control groups that also included highly hypnotizable participants and low hypnotizable participants. Half of the participants were hypnotized before experiencing labor pain and the other group was given relaxation and breathing training before delivery. Results showed both highly hypnotizable groups had shorter first stages of labor, a reduction in medication,

and more spontaneous deliveries than controls. Another interesting finding is that pain threshold improvements occurred in the highly hypnotizable group (McCarthy, 1998). McCarthy (1998) also reports that he has successfully used hypnotic techniques with over 600 women in an effort to perfect the art of hypnosis during labor. In several cases, a significant amount of practice (30+ days) was required in order for the participants to experience enough relief during labor (Crasilneck & Hall, 1975). The hypnotizability of the participants was not reported. In general, the literature seems to support the efficacy of using hypnosis throughout pregnancy and delivery.

### *Cancer Pain*

Cancer as a disease brings with it a multitude of pains and discomforts, which require the individual and the medical team to be diligent about treating the patient's pain. With all the problems in the treatment of cancer, pain is the most common symptom reported. All patients must undergo a variety of procedures such as blood draws, lumbar punctures, bone marrow aspirations, imaging, chemotherapy, and/or radiation. Chemotherapy often has additional difficult side effects such as nausea, vomiting, lowered immune system, and neuropathy. Similarly, radiation therapy can cause skin burns, gastrointestinal distress, or general discomfort. The pain from cancer and related procedures often requires increased pain medications resulting in the patient sleeping for long periods. This is frequently at the expense of quality time with their family and friends (Crasilneck, 1995).

Hypnosis is considered an effective solution for cancer related pain as reported by the NIH (1996). Hypnosis is found to be quite effective in relieving procedure-related

pain such as bone marrow aspirations for both children and adults (Barber, 1996; Hart & Hart, 1998). Children find it easy to follow along with the imagery and welcome the opportunity to escape the pain. One study looked at children undergoing bone marrow aspirations using hypnosis and another group using common hospital techniques such as distraction and breathing, and found that hypnosis was superior (Smith, Barabasz, & Barabasz, 1996). An additional finding was that parents felt they had more control over the painful situation and felt less helplessness, (Liossi, 1999). A commonly cited use of hypnosis is decreasing the nausea and vomiting side effects from chemotherapy. There is extensive literature available showing hypnosis to be efficacious for this purpose (Harper, 1999; Jay, Elliott, & Varni, 1986; Newton, 1982; Pattison, 1997; Redd, Rosenberger, & Hendler, 1982).

Additionally, hypnosis is often utilized successfully for individuals with anticipatory nausea and vomiting. Anticipatory nausea and vomiting is so aversive that at times it results in individuals dropping out of treatment (Newton, 1982; Pattison, 1997). Dropping out of treatment has also been reported for individuals with needle phobias, for which hypnosis is also effective (Dash, 1981; Medd, 2001; Morgan, 2001). Hawkins (1995) demonstrated the effectiveness of hypnosis for anticipatory nausea and vomiting. Out of the three pediatric oncology groups, there was a 40% decrease in symptoms for the hypnosis group, 20% decrease for the counseling group, and an 11% increase for the controls.

There are multiple other uses for hypnosis when treating individuals with cancer. One of the most difficult and challenging pieces in working with cancer patients are the end of life issues that may arise. Hypnosis can assist the individual in dealing with

feelings of hopelessness and apathy through imagery (Le Baron, 1989). Additional work can be done using a technique called the hypnotic death rehearsal (Leviton, 1985). This assists individuals with fears regarding death by rehearsing what they believe it will be like. Individuals find this technique helpful and anxiety reducing.

### *Burn Pain*

Burn patients are viewed as the ideal patients for hypnosis. They are often going through excruciatingly painful procedures that are time limited, and these procedures can occur up to 2 times per day.

When a person experiences a burn, the body's response to the burn injury is inflammation, which is actually worsening the injury by killing the deeper dermal layers of skin (Ewin, 1986). Ewin, a surgeon and psychiatrist, is a leading proponent for using hypnosis in the emergency department and for burn patients. Ewin proposed that hypnosis could mediate the damaging inflammatory reaction if it occurred within the first 4 hours, which would ultimately decrease the severity and the depth of the burn. Ewin reported good results with burn patients using hypnosis early on and described in depth his hypnotic induction. He used a vasoconstriction method that had the patient imagine the burned area as cool or cold in order to decrease the blood flow and ultimately the swelling around the burned area.

Moore and Kaplan (1983) used hypnosis on 5 patients with bilateral burns one day post injury. Instead of using an induction to cool the area, suggestions were made to warm one side in order to increase blood flow to that area. Results showed that 4 of the 5 participants had accelerated healing on the treated side, with the fifth showing

rapid healing on both sides. The difference between Ewin's vasoconstriction strategy and this vasodilation strategy was explained by how sprains or bruises are treated. Initially, cold is used to keep the swelling down and then a day or more following heat is used (Peebles-Kleiger, 2000).

Patterson, Goldberg, and Ehde (1996) reported on the use of hypnosis for several case studies. They standardized a method that is used at the University of Washington Burn Center. This method requires meeting with the patient prior to debridement (cleaning) of the wound. The person is taught the procedure and given post hypnotic suggestions. Staff members are trained in the procedure and in using the posthypnotic cue of touching the patient's shoulder. This posthypnotic cue more readily puts the patient into hypnosis for subsequent sessions. The authors had excellent results with the first two individuals this protocol was used on and only moderate results with additional participants. Another study looked at 30 patients that were severely burned between 10-25% of their bodies and were randomized to receive hypnosis or stress reduction strategies. Results showed that hypnosis was superior at reducing anxiety and pain before and during dressing changes (Frenay, Faymonville, Devlieger, Albert, & Vanderkelen, 2001). In general, research and case studies seem to support the use of hypnosis with burn patients.

### *Procedural Pain*

Procedural pain is any pain that is involved while a procedure is occurring. This can be a small amount of pain such as receiving stitches to a lot of pain as in limb amputation. Surgeries performed while under hypnoanesthesia have been reported in



the literature since the 18<sup>th</sup> century and possibly earlier. A prominent case featured in the literature was performed by a physician named Ward. In 1842, he hypnotized a patient and successfully amputated his leg while the patient remained pain free (Hilgard & Hilgard, 1975). Operating without a chemical anesthetic is certainly not the norm, but preparing patients for surgery and utilizing hypnosis as an adjunct and solely for surgical anesthetic has been frequently performed with success since that time (Chaves, 1989). There is disagreement about how many patients could actually undergo such drastic procedures without the use of chemical anesthesia, but there appears to be agreement that this is not the primary clinical application of hypnosis (Chaves, 1989). Other related uses of hypnosis may be to reduce anxiety going into surgery, reduce healing time post surgery, reduce the amount of pain medication required overall, numbing for dental work, and to reduce acute post surgical pain (Lynch, 1999).

### *General Pain*

Beyond what is detailed above there are numerous areas where hypnosis is utilized to alleviate pain such as dental procedures, migraine headaches, receiving stitches, getting shots, having blood drawn, IV placement, and other disease related pain such as fibromyalgia. The literature is clear that the only limitations to the use of hypnosis for pain management are the clinician's limitations (Crasilneck, 1995; Pattison; 1997). Hilgard (1986) reported on the relative success of hypnotherapy for pain when compared to other methods. The findings showed that hypnosis provided the greatest

relief for both cold-pressor and tourniquet pains, followed by morphine, and finally acupuncture.

The literature clearly supports the use of hypnosis for dental procedures. In fact, there are several associations in Canada (Ontario Hypnosis Centre), Europe (British Homeopathic Dental Association), and the United States (International Medical and Dental Hypnotherapy Association) dedicated to educating people on the field of hypnosis and hypnosis in dentistry.

In addition to pain management, hypnosis can assist in alleviating anxiety related to going to the dentist, fear of needles, the gag reflex, and can assist those allergic to or unwilling to have Novocain for pain relief (Hilgard, 1986; Medd, 2001; Temes, 1999). Beyond dental pain, migraine headaches are known to be extremely painful and debilitating. There are multiple types of migraine headaches having a variety of organic causes as well as having a large psychological component (Hilgard, 1986). Migraines are thought to respond to a variety of hypnotic inductions, and when the migraine is treatment resistant to other methods, hypnosis can be used. Crasilneck (1995) reported good results on clients with treatment resistant migraines using the bombardment technique. The clients are then overwhelmed during one session with multiple hypnotic techniques such as relaxation, displacement, age regression, hypnoanesthesia, and glove anesthesia in order to breakthrough the resistance.

### *Contraindications*

Ultimately, hypnosis appears to be quite effective for pain management, but does have a few reported negative side effects. Lynn, Myer, and Mackillop (2000) reported

that between 8-49% report transient negative post-hypnotic experiences such as headaches, dizziness, nausea, and stiff necks. However, they reported that a much larger percentage (62-85%) report positive experiences including relaxation. Further, emotions may be elicited through the session that the individual was not prepared for, which can make them uncomfortable (Zilbergeld, Edelstien, & Araoz, 1986). There are relatively few contraindications for hypnosis noted in the literature. There are even less if the hypnotherapist has been adequately trained and hypnosis is being used properly as an adjunctive therapy (Zilbergeld, Edelstien, & Araoz, 1986).

### *Hypnosis and Hypnotizability*

There are multiple theories as to why hypnosis is effective in general, and more specifically in pain control. There are two dominant theories of hypnosis: the neodissociation theory and the sociocognitive theory. The neodissociation theory is based on the idea that people are in an altered state of consciousness when in hypnosis. This theory was originally based upon Jean Charcot and Pierre Janet's (1919) Dissociation theory. Hilgard (1986) reported that dissociation involves an amnesia-like barrier that blocks information from the conscious mind. The dissociated part is referred to as the "hidden observer." In pain reduction, it is posited that psychological dissociation occurs in order to separate the conscious mind from painful sensations or feelings. This dissociation occurs automatically and involuntarily due to hypnotic suggestions (Sapp & Evanow, 1998).

The neodissociation theory is also being used in this research because of the theory's ability to explain dissociative phenomena such as the existence of hidden

memories Hilgard's (1986, 1994). It is believed that certain memories and aspects of the personality are partitioned off or are inaccessible due to the amnestic barrier. Studies seem to support the idea of the amnestic barrier by showing that information stored in memory becomes inaccessible to conscious awareness (Berry & Broadbent, 1995; Blaxton, 1989). For example, a patient in a hypnotic state might use hypnosis for pain control while at the same time observing a burned limb being debrided by a surgeon. Hilgard (1994) believes that observing and dissociated parts are almost always interactive. Watkins and Watkins (1997) refer to the dissociated parts as ego states.

The sociocognitive model views hypnosis as goal directed and a product of social influences and cognitive behavioral strategies (Sapp & Evanow, 1998). As part of this model, participants are thought to “think along with and imagine suggestions presented” during the hypnotic situation (McConkey, Sheehan, & White, 1979, p. 265). The hypnotic experience is also dependent upon expectation effects and role-playing. Pain reduction is believed to be due to the distraction of the individual; however, studies have shown that distraction by itself is not comparable to hypnosis for pain control (Freeman & Barabasz, 2000; Smith, Barabasz, & Barabasz, 1996). The dissociative aspect assists the participant in pain control. Each theory also has a corresponding hypnotizability scale based on the theory. For the purposes of this research, the Stanford Hypnotic Clinical Scale: Adult (SHCS; Morgan & Hilgard, 1979) will be used as it coincides with the Neodissociation theory.

Level of hypnotizability is found to significantly correlate with the amount that hypnotic suggestions can reduce pain. Hilgard and Hilgard (1975, p. 68) reported,

“Hypnotically responsive individuals will most likely reduce their pain, but not all of them are successful; and the least hypnotically responsive are less likely to reduce their pains by suggestion, although some of them can.” Figure 1 below shows a graph reported in Hilgard and Hilgard depicting pain reduction following suggestion for analgesia as related to level of hypnotizability. This graph shows that “pain is reduced by one-third or more in 67 percent of highly hypnotizable, but only 13 percent of the low group.” Crawford, Brown, and Moon (1993) found that highly hypnotizable participants had extremely focused attentional styles as well as the ability to filter out extraneous information or stimuli. For example, during hypnotic analgesia, a person may have physiological reactivity, but not perceive the painful stimuli. Possibly this disattentional process differentiates them from low hypnotizable participants during painful procedures. Further, multiple studies have shown that high versus low hypnotizable participants generate more theta (3—7 Hz) electroencephalograph power during waking, hypnotic rest conditions, and hypnotic suggestion (Barabasz, 1982; Crawford, Brown, & Moon, 1993; Freeman, Barabasz, Barabasz, & Warner, 2000). The theta power is thought to correlate with intense mental effort, focused processing, and acknowledgement with decision not to attend to certain stimuli (Crawford, Brown, & Moon, 1993). Differences have also been shown between highs and lows with respect to high hypnotizable participants showing an immune response as measured by B-cells and helper T-cells (Ruzyla-Smith, Barabasz, Barabasz, & Warner, 1995). Lastly, Lynn et al. (2000, p. 250) reported, “If hypnotic suggestibility is not associated with treatment outcome then

## PAIN REDUCERS

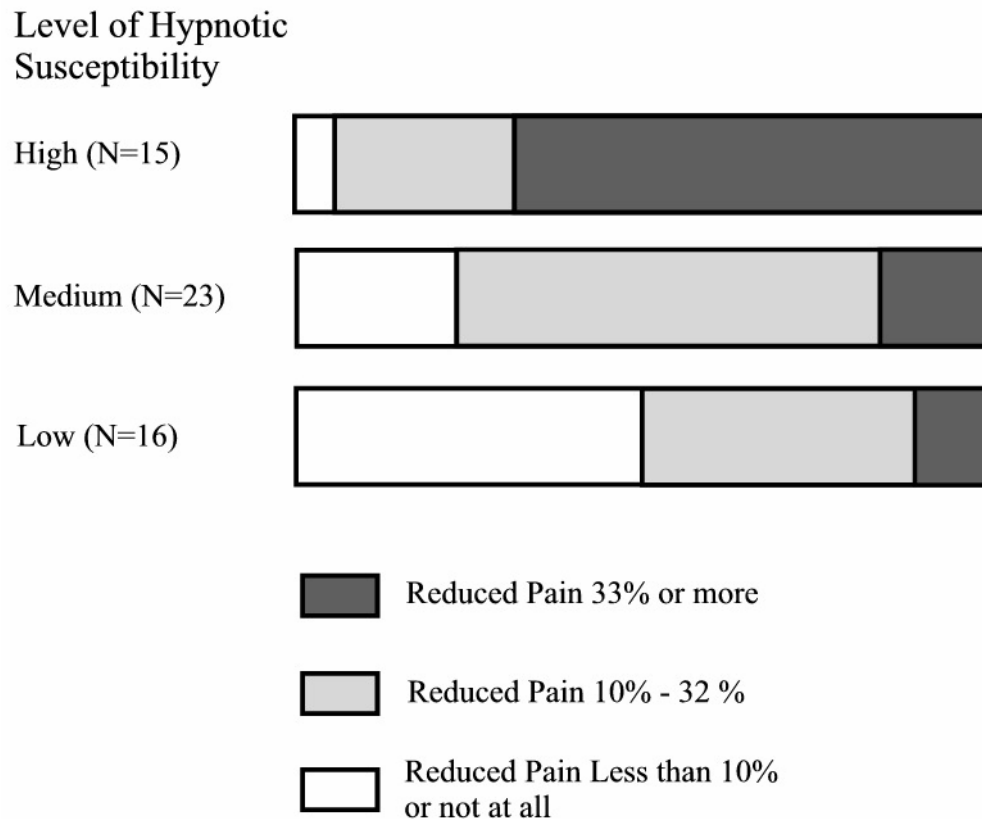


Figure 1. This shows the reduction of pain through hypnotically suggested analgesia as related to level of hypnotizability. Participants included 54 university students with limited hypnotic experience of mainly one induction and a test for hypnotic responsiveness (Hilgard & Hilgard, 1975, p. 69).

hypnotic procedures have little bearing on any positive gains achieved.” Barabasz & Barabasz (1992) reported that specificity of hypnosis in treatment requires the distinct relationship between hypnotizability and treatment outcome.

### *Phantom Limb Pain and Hypnosis*

When examining the literature on phantom limb pain it becomes evident that there is a shortage of studies with an ample amount of subjects. The majority of the studies reported, regardless of hypnosis, are case studies or small groups. The

following review includes mainly case studies using hypnosis, relaxation, and biofeedback as a treatment for residual stump pain and/or phantom limb pain.

Oakley et al. (2002) presented two case reports in addition to reporting on 10 references in the literature utilizing hypnosis for phantom limb pain. The articles reviewed are broken down by ipsative/imagery and movement/imagery. Ipsative means that individual differences are taken into account when utilizing hypnosis. The hypnotic session is specific to the individual's pain problem. Movement/imagery relies on the individual imagining the phantom moving or changing positions in order to relieve the pain. A brief summary of their findings on the 10 articles can be found in Table 1. Out of the 12 cases reported, there is only one report of the participant being pain free at the time of follow up. The other cases report a significant decrease in pain at least to a manageable level. What can be seen from these cases is the lack of consistent information that each article presents. Only a few articles actually clearly described the hypnotic intervention and the status of the pain before the intervention. Further, the follow up information was generally vague. In most cases, it was unclear how much the individual had actually improved and in what way they improved.

Beyond the review article, one additional article was found that addressed hypnosis and phantom limb pain and this is the study by Cedercreutz and Uusitalo (1967) that was already discussed in Chapter one. Thus, as can be seen, very few studies have been conducted in this area, and any future studies would appear to improve the phantom limb literature.

Table 1. Literature review for phantom limb pain and hypnosis

Article Author	Problem	Treatment	Outcome
Ipsative/imagery based			
1) Siegel (1979)	Left above knee amputation (pain before)	10 sessions total. Hypnosis, relaxation, self hypnosis (cold imagery, glove anaesthesia)	Pain meds reduced by 50%. Able to control pain by herself.
2) Chaves (1986)	Amputation of arm (pain before)	3 hypnosis sessions. (Warmth imagery, audio tape)	Pain free at 5 year follow up.
3) Chaves (1993)	Mid-thigh amputation, right leg.	# of sessions unknown. Suggest phantom shrinking, audio tapes.	Decrease in pain by 30%, occasionally pain free, phantom is shrinking.
4) Sthalekar (1993)	Avulsion of right brachial plexus	21 sessions over 8 weeks. Imagery, relax, future oriented suggestions.	Pain under control. No longer interfering with daily activity. Returned to work.
5) Brown et al. (1996)	At knee amputation, right leg.	3 sessions. Hypnotic metaphor. Severe pain.	12 month follow up-wearing prosthesis & mountain biking. No report of pain.
6) Oakley et al. (2002)	Above knee amputation, right leg (no pain before)	8 sessions. Hypnotic imagery.	3 month follow up – chiseling pain gone, other pain still there, coping better.
Movement/imagery based			
7) Muraoka et al. (1996)	Above knee amputation, left leg (no pain before)	64 sessions over 3 years. Suggest movements of leg becoming normal & shrinking phantom.	Phantom disappeared with continued intermittent pain. Pain reduced from 8 to 1.
8) Le Baron & Zeltzer (1996)	Amputate left leg (unknown pain)	3 sessions. Suggest relax & muscle contraction in both legs. Transfer numbness to left leg.	2 week follow up 50-100% pain relief, less bothered by residual pain.
9) Erslund et al. (1996)	Above elbow, right arm (unknown pain)	# sessions unknown. Relaxation & suggest finger movement / uncramping.	Pain reduced, feel of control, residual pain was tolerable.
10) Rosen et al. (2000)	Traumatic amputation of right arm (no pain)	12 session over 6 months	Pain free during 1 <sup>st</sup> session, intermittent after that then down to 50%.
11) Rosen et al. (2000)	Traumatic amputation of fingers, left hand (no pain)	12 session over 6 months Imagined moving in comfortable way.	Phantom is shrinking. Pain down from 40 to 20 and frequency reduced by 50%.
12) Oakley et al. (2002)	Avulsion left brachial plexus (no pain)	1 session with imagined mirror box & age regression	During session no pain, pain reduced from 10 to 2.5.

Table 1. This is a summarized version of the table that is found in Oakley, Whitman, & Halligan, (2002). This table reviews the cases that have been reported in the literature. Two types of treatments are represented in the literature ipsative and movement. Ipsative/imagery takes into account the individual differences and tailors the suggestions to the person. The movement/imagery based has the individual visualize moving their phantom in order to alleviate the pain.



### *Relaxation*

Three articles report on the use of relaxation techniques to control phantom limb pain. Sherman, Gall, and Gormly (1979) examined 16 male, veteran, phantom limb patients treated with a combination of progressive muscle relaxation, biofeedback from stump and forehead, and reassurance that sensations were normal. Two patients were recent amputees and required only three sessions to become pain free. Others required six or more sessions with eight mostly pain free, and the rest with significant decreases in their reported pain. They also found that patients reportedly felt less anxious, more relaxed, and were able to sleep better at night. Sherman is a leader in the field of phantom limb pain. He is a proponent for the use of relaxation techniques when amputees describe their pain as cramping or spasms

McKechnie (1975) described a case of an 18-year-old male who lost his right arm 13-months following a motor vehicle accident. He was fitted for a prosthetic arm and proceeded to have pain that varied from a dull ache to severe sharp pain. The pain remained stable over nine years. He also endorsed symptoms of anxiety and depression. He was then asked to imagine himself clenching his phantom fist and letting it go. He repeated this and subsequently reported his pain dissipating. The pain remained mainly undetectable for up to an hour. The participant practiced these techniques at home and two months later reported complete relief of pain.

Levine (1990) considered relaxation and stump pain. There were three levels of treatment: relaxation/reinterpretation of pain group (n=18), relaxation only group (n=18), and wait list control group (n=18). Each participant had seven sessions with the exception of the waitlist control group, which met two times. Results showed that all

three groups showed some improvement on measures of stump pain. However, the relaxation/reinterpretation group had the greatest improvement compared to the other groups. Participants continued to have stump pain, but it had been slightly decreased following the two treatment conditions.

### *Biofeedback*

There are two articles available on the use of biofeedback in the treatment of phantom limb pain. Sherman, Arena, Sherman, and Ernst (1989) strongly advocate the use of biofeedback dependent upon the description of the pain. If the pain is described as burning, tingling, and throbbing, then it is often caused by decreased blood flow in the residual limb, which can be corrected with biofeedback. Thermographic recordings of near surface body temperature were made on 30 amputees with phantom limb pain. Each participated in two to four sessions. There was a consistent inverse relationship between intensity of pain and stump temperature. This was also true for those reporting cramping pain. The amputees are believed to tighten the muscles in their stump, which decreases the temperature. Thus, progressive muscle relaxation and skin temperature biofeedback are used to train participants to increase their skin temperature. The interventions were reportedly successful, but the authors did not elaborate on them.

Belleggia and Birbaumer (2001) reported on one case of a 69-year-old man, whose arm was amputated at the right elbow. He had pain in his hand prior to amputation reported as a seven on a ten-point scale. Three years post amputation he described his pain as burning and shooting. Two sessions were spent recording baseline measures of the stump temperature. Six sessions were spent teaching him

ways to increase perceptual awareness of stump sensations and muscular tension. The next six sessions were spent working to decrease the pain. At three and 12-month follow-ups, no pain in the stump or phantom was reported. The only sensation that remained was the telescoping of his phantom fingers attached to the stump.

### *Summary*

As can be seen from the paucity of literature available on the topic of hypnosis and phantom limb pain, additional studies are advised to further our knowledge of this relationship. It is likely that hypnosis can be effective with phantom limb pain, given the efficacy of hypnosis with other chronic pain problems. The neo-dissociation theory and associated research supports the use of hypnosis with residual stump and phantom limb pain. The amputees can be fully immersed in the hypnotic experience, which allows them to dissociate the painful sensations out of conscious awareness. The effects are then multiplied as this also triggers the gating mechanism within the spinal cord to close and release endorphins in the brain. This effect changes the suffering component and the individual's perception of the pain.

## CHAPTER THREE

### METHODOLOGY

#### *Participants*

Twenty participants (18 male & 2 female) from the Charleston, West Virginia area and surrounding communities (Appalachian region) participated in this research project. Two additional participants opted out at the beginning of the study. The participants were amputees with a minimum of six months post amputation in order for their pain to be considered chronic. Participants had to currently be experiencing residual stump pain, phantom limb pain, or both. Six months was the minimum with the maximum time being 63 years spent in pain ( $M = 131.4$ ,  $SD = 213.7$  months). All participants were required to be over the age of 18, although the minimum age was 31 with a maximum age of 70 ( $M = 52.2$ ,  $SD = 10.9$  years).

A minimum of twelve amputees were sought initially for each the control and the hypnotic treatment group. However, given the limited timeframe of the study only ten participants in each group were obtained. Participants for both groups were recruited using several of the following methods. Doctors working with amputees at Charleston Area Medical Center (CAMC) were given a letter (Appendix A) describing the research project and some recruitment fliers (Appendix B & C) to hand out. The care providers were then asked to refer prospective participants to the study. Patients meeting research criteria while staying on the CAMC Rehabilitation inpatient unit were recruited by word of mouth from the principal investigator while doing rounds with the doctor. Outpatients were recruited by their physician through the Amputee Clinic as they came in for follow up appointments. The physician frequently referred patients to the study

and asked patients if they would like to speak with someone from the study right now. When patients responded positively the principal investigator was onsite and available at that time to answer any questions they may have had. They were then given a time to talk further and complete the screening questionnaire. If patients responded negatively or neutral to the study, they were given a flyer on the study and no further contact was made. Flyers were also given to the local businesses and associations that were known to deal with the amputee population such as Appalachian Pain Management Center, Boll Medical, Charleston Area Amputee Support Group, Hanger Prosthetic & Orthotics, Inc., Lehotay Prosthetics, Mountain State Prosthetics, and West Virginia Rehabilitation Center. Businesses were asked to refer their clients to the study by giving the patients the flyer during visits and asking the patient to call if interested. The majority of participants were recruited through the Amputee Support Group (n = 8) and the Amputee Clinic (n = 7).

As prospective participants contacted the experimenter, they were interviewed over the phone or in person to see if they met the study's inclusion criteria. To be included participants had to be over the age of 18. They were asked not to use illicit drugs or alcohol while in the study. Those potential participants known to be in drug/alcohol treatment were excluded. They could not have had a prior episode of psychosis or any current psychological diagnosis that could trigger strong emotions while in hypnosis such as Post Traumatic Stress Disorder, Bipolar Disorder, or Panic Disorder. The individual needed to be motivated to attend all sessions and complete the daily self-report pain form at home. Participants agreed to be hypnotized as part of

the research. They needed to be six months post-amputation and report pain in their stump, phantom limb, or both.

Participants meeting the inclusion criteria were then scheduled for an initial appointment where they read and signed the informed consent (see Appendix D & E), completed the McGill Pain Questionnaire, Amputee Questionnaire, and underwent a brief standardized hypnotizability scale (Stanford Hypnotic Clinical Scale; SHCS). Based on participant's scores of 2 or greater on the SHCS they were randomly assigned to the control or the treatment group. Any participant not meeting the study criteria of 2 or greater would have been informed of their low score and given the option of continuing or opting out of the study. Participants were not informed that the SHCS involved scoring. They were told that the scale simply told the investigator how best to use hypnosis to help them. No participants in this sample had a score below 2. Three participants did have a score of 2 and they were told their score was on the lower end of the scale and they were given the option of withdrawing; all participants chose to continue. The participant's hypnotizability scores ranged from 2 to 5 ( $M = 4.15$ ,  $SD = 1.14$ ). This sample appears to be slightly skewed from the norm with eleven participants with a score of 5 and four participants with a score of 4.

The random assignment took place following the scoring of the SHCS. The principal investigator simply had twelve cards with treatment written on them and twelve cards with control written on them. The cards were placed upside down in a 4 X 4 box and a card was blindly drawn from the box to determine which group the participant would go into. The card was then permanently removed from the box. This was done without the participant being aware.

## *Measures*

### *Telephone Screening Questionnaire*

This 14-item questionnaire is based on the inclusion/exclusion criteria and was used during the first telephone or initial meeting. Based on their answers, potential participants were told they did or did not qualify for the study. No potential participants were disqualified during the screening process. Those that met the inclusion criteria were scheduled for their initial visit. (See Appendix F).

### *Amputee Questionnaire*

This 23-item questionnaire was taken from the Sherman, Sherman, and Parker (1984) 13-item survey that was sent out to 5,000 veteran amputees regarding phantom limb pain and residual stump pain. No information on the norms of this scale is available. Questions 8, 9, and 10 were omitted from the original questionnaire, as the questions did not pertain to this research. Several questions were added in order to gather additional information such as work status, pain before amputation, psychological history, and pain related issues. The questionnaire has 23 questions and is broken down into stump pain, phantom sensations, and phantom pain similar to the original questionnaire. This questionnaire gathered descriptive information and asked participants to report and describe their stump and phantom pain. (See Appendix G).

### *McGill Pain Questionnaire (MPQ; Melzack, 1975)*

The MPQ was designed to measure the effects of various treatments of pain management on patients with various pain related problems (Turk & Melzack, 2001).

This measure has been found to show a “high degree of agreement on the intensity relationships among pain descriptors by subjects from different cultural, socioeconomic, and educational backgrounds” (Turk & Melzack, 2001; p. 38). This questionnaire was originally validated in 1975 on a mixed sample of 297 pain patients. It has since been translated into 15 languages and found to be helpful in clinical applications as well as research.

Participants are verbally instructed that the words will be read aloud by the principal investigator in blocks of words. They are to carefully choose the word or words within each block that best describes their pain over the past week. They can choose all of the words in a block, some of them, or none of them. They are also told to ask for clarification on any words they do not understand. The words can be read aloud repeatedly until the participant makes a choice. The questionnaire takes 5-10 minutes to complete.

The MPQ has 78 words grouped into 20 blocks of pain descriptors, which can be grouped into four subclasses including Sensory, Affective, Evaluative, and Miscellaneous categories of pain. The subclasses are then summed for a total Pain Rating Index (PRI) score. The PRI score is formulated based on the rank values of the words chosen as a summed total of all subclasses. The ranking begins at 1 for the lowest word and up to 6 for the highest word. This total score was looked at for differences between pretest and posttest. All participants completed this questionnaire at the beginning and at the end of the study. Melzack (1975) reported alpha coefficient = 0.95 for the PRI ( $p < .05$ ). The intercorrelations for each subclass are 0.94 (S), 0.92 (A), 0.93 (E), and 0.91 (M). Second, the Number of Chosen Words (NCW) will be



looked at both pre and post to see if any differences are apparent within and between groups. Melzack (1975) found that the NCW correlates highly with the PRI subclasses ( $r = .97$ ) or the total rank ( $r = .89$ ). Lastly, the Present Pain Intensity (PPI) allows words to correspond to a number that rates their pain from no pain (0) to excruciating pain (5) at the present moment. Participant's score on this were evaluated for differences between their pre and posttest. The PPI was found to correlate significantly at the  $p < .01$  level on all subclasses of words.

Van Duijn (1995) reported the psychometric properties as fair to good with Pearson correlation coefficients ranging from 0.29 to 0.83 on the 20 individual blocks of words. Internal consistency was found to be good with discriminative validity found to be strong. The distributions of scores for the different pain populations such as phantom limb, cancer, and low back have been cited. Katz and Melzack (1991) reported that amputees experiencing phantom limb pain and phantom limb sensations endorsed 33% of the same descriptors. (See Appendix H).

### *Numerical Rating Scale (NRS)*

This heading NRS actually represents three scales that were used in this study that are all basically the same measure, but labeled differently according to their purpose. All measures use a scale of 0 to 100 ranges for consistency. The NRS can be 0 to any number chosen to represent the continuum. Zero to 10 is more commonly seen in the literature and used in medical settings, but the 101-point scale is more practical for the purposes of this research in order to maximize the response categories. The NRS is a valid measure of intensity and shows positive correlations with other

intensity scales such as the Visual Analog Scale ( $r = .78 - r = .92$ ;  $p < .001$ )(Bergh, 2001; Turk & Melzack, 2001). Haase and Hazell (1987) report the reliability using Chronbach's coefficient alpha as 0.96. Other studies have reported similar findings as well as good test-retest reliability ( $r = 0.75 - r = 0.83$ ;  $p < .001$ ). Turk and Melzack (2001) reviewed this scale and reported on the high rate of compliance due to the simplicity of the scale. The authors also reported that elderly and people with disabilities have an easier time using this scale compared to other related types of scales. Following are the three Numerical Rating Scales were used in this study

#### *Daily Pain Rating Scale.*

This Numerical Rating Scale requires the participants to rate their pain on a scale of 0 to 100 everyday for period of one month. Zero represents no pain at all and 100 is the worst pain imaginable. Participants are told to rate their pain at the end of each day at its most severe point. Therefore, when they look back on their day, using one score they are to rate the worst pain they felt all day long. The first week was their baseline readings. The last week is the post-treatment readings. Pre and post measures were looked at for within group and between group differences. Participants were trained in how to rate their pain during the first session and asked if they would prefer to have the principal investigator call them daily to complete the form over the phone. No participants agreed to be called on a daily basis. Participants also documented the location of the pain they were rating and if they noticed any change or difference in their pain over the course of the day, they are documenting. The DPRS was returned on a weekly basis. The principal investigators went over the pain readings for the week and

discuss anything noticeably different from the previous week with the participant. If the participant forgot the pain scale, they were asked to call home if possible and have the scale read to them over the phone while they rewrote the information. Alternately, the principal investigator called them at a specified time to get the readings. (See Appendix I).

*Prehypnotic Pain Scale (PPS) and Posthypnotic Pain Rating Scale (PPRS).*

These Numerical Rating Scales were named for their function, which is to measure pain before and following hypnosis. They are simply a 0 – 100 pain rating scale with zero representing no pain and 100 representing the worst pain imaginable. This same NRS is on the DPRS for consistency. Participants rate their pain intensity before the hypnosis session and again following the hypnosis session in order to track their immediate response to the hypnosis. Only the treatment group completed these scales. (See Appendix J and K).

*Stanford Hypnotic Clinical Scale (SHCS; Morgan & Hilgard, 1979)*

The SHCS-Adult is a 5-item standardized assessment scale of hypnotic responsiveness, producing a rating of hypnotizability ranging from 0 to 5. This scale was developed from the 12-item Stanford Hypnotic Susceptibility Scale: Form C (Weitzenhoffer & Hilgard, 1963). Scores on the scale are normally distributed with the majority of responses in the middle. This scale correlates with the Form C ( $r = .72$ ) and similarly for other established measures of hypnotizability (Bryant, Guthrie, & Moulds, 2001; Moene, Spinhoven, Hoogduin, & Van Dyck, 2002). In a longitudinal study, which

showed the stability of hypnotizability, moderately high correlations were found between fifty Stanford University students' original scores and their retest scores at ten and twenty-fives years later on the Stanford Hypnotic Susceptibility Scale: Form A. Correlations of 0.64 and 0.71 respectively were found (Farthing, 2003).

This scale involves a standardized brief induction followed by 5 items (hand lowering, age regression, dream, posthypnotic suggestion, posthypnotic amnesia). Items are scored by the clinician as pass or fail based on what is observed or reported. Scores from 0-1 are considered low, 2-3 moderate, and 4-5 highly hypnotizable. The scale takes approximately 20 minutes to administer.

### *Procedures*

Participants were given information on the study using the various methods as previously described above. The initial flyer for the study was given out, but there was little response. After talking with the amputees, it was decided that due to the extra difficulties that they were having in obtaining transportation that participants should be paid for each session. With IRB approval, \$20 was given to each participant for each session. Participants in the treatment group received \$100 total at the end of all of their sessions. Participants in the control group received \$40 total at the end of their two sessions. Only two participants had begun the study as it was originally formulated, without pay. Those two participants were then asked to complete the updated Informed Consent (Appendix E) in order to be paid at the end of their sessions. The CAMC Foundation, Inc. and the Sara and Pauline Maier Foundation, Inc. assisted in the support of this research by funding \$1680 towards the funding of participants.

Participation in the study was voluntary and interested amputees were asked to schedule a time to go over the Telephone Screening Questionnaire to determine whether they were eligible for the study and to answer any questions they may have had.

When participants were contacted by phone to go over the screening questionnaire, the conversation was generally unstructured and free flowing. Potential participants were allowed to discuss their pain related issues at length and conversations lasted between 15 and 45 minutes ( $M=37.52$ ;  $SD = 8.03$ ). All interested amputees met the inclusion criteria ( $N = 22$ ). They were then scheduled for their initial appointment. A minimum of 12 amputees in each group was initially sought. Participants were randomly assigned to either the hypnosis treatment or the control group based on meeting the hypnotizability cut-off criteria of 2 or greater. Participants in the hypnosis treatment group met with the principal investigator individually for a total of five sessions and the control group for two sessions.

Because the use of hypnosis was new to the Charleston Area Medical Center extra precautions were taken to ensure that all participants had a positive experience. To begin with, all questions, stereotypes, myths, and fears were adequately addressed during the phone conversation and the initial session before participants underwent the first induction. If at that time, a participant was still not comfortable with the study or hypnosis that person was given the option to withdraw from the study. Two participants withdrew before undergoing the first hypnosis session. Second, all participants with a history suggesting they may be vulnerable to abreacting while in hypnosis were excluded from the study. Even though the negative effects of hypnosis are minimal,

embarrassing, emotional, or traumatic events could potentially be brought up through the individual hypnotic sessions. No unplanned problems or potentially negative experiences occurred during any of the hypnosis sessions.

It was expected and found that the participants in the control group would be similar in age, work status, gender, hypnotizability, and level of education to the hypnosis treatment group.

Despite the fact that residual stump pain and phantom limb pain are chronic conditions there is so little information available on how their pain may fluctuate over time that the control group adds an important piece to this study. Further, participants in both groups continued with their regular treatments they were using previously to manage their pain, which mainly consisted of medication. Participants were simply asked to let the investigator know if they added in any new treatment or changed what they were doing. Many of the participants came in for regular visits to the amputee outpatient clinic, come in for physical therapy, and/or they may meet with the prosthetist regularly to evaluate how things are going. Despite most participants receiving some form of intermittent or ongoing treatment, this did not appear to have an impact on their pain intensity scores. With the groups being comparatively equal, the control group's ratings were relatively stable based on this ongoing treatment.

## *Meeting 1*

### *All Participants*

All participants met with the principal investigator individually. The informed consent (see Appendix D & E) was verbally explained at the beginning of the session and all participants were asked to sign the consent form before proceeding with the rest of the study. Any questions or problems regarding hypnosis or the study were formally addressed before proceeding with the questionnaires.

Time was spent at the beginning of the session to have the participant tell explain the details surrounding their amputations and any feelings they had as a way to build rapport with them. Rapport is known to be one of the most important pieces when assisting people in change.

All questionnaires were given by the investigator asking the questions and filling in the questionnaire. The Amputee Questionnaire was administered followed by the MPQ, and then the SHCS was administered. Participants were told that little is understood about residual stump pain and phantom limb pain and it is important to know how a person's pain fluctuates over time. Then the Daily Pain Rating Scale was handed out and explained to the participant to ensure they understood how to fill out the scale.

All participants were asked if they preferred the researcher to call them on a daily basis to get their readings, but all preferred to do it on their own. Once the SHCS was scored, the investigator pulled out a card and randomly assigned the participant to a group. If they were part of the treatment group, they were scheduled for their initial hypnosis session the following week and asked to bring back their DPRS.

Control participants were told that they would be contacted in 3 weeks to schedule their next meeting and complete some additional questionnaires. They were given 4 weeks of the DPRS. Control participants were not told they were in the control group. They were told that the hypnosis sessions would begin following monitoring their pain for a month. All participants were asked not to talk about the study with others until the study was over.

If a participant was unable to make their appointment for one week then the next available appointment time was used. Similarly, if the participant called to cancel their appointment they were rescheduled as soon as possible. The MPQ and the DPRS are their baseline measures. This meeting lasted approximately one hour and thirty minutes.

#### *Meetings 2, 3, 4*

##### *Hypnosis Treatment Group*

All meetings were scheduled on an individual basis and preferably one week apart though frequently the meetings were cancelled due to comorbid health issues and ride availability. Individuals met with the principal investigator alone at CAMC on the rehabilitation floor. The DPRS was looked at and talked about. Any changes or fluctuations in pain were discussed. The Prehypnotic Pain Scale was given before the tailored hypnosis session began.

All beginning phases of the induction were the same standardized procedure utilizing a progressive muscle relaxation with a light traveling through their body and with stairs for deepening. All participants were asked to double their depth by going



down a second flight of stairs before proceeding with the suggestions. The hypnosis sessions were completely individualized to the participant.

Part of our initial conversation included their fears, their likes, and things that brought them comfort. Clinical judgment was used to gauge what suggestions would be the most helpful to their specific issues. All sessions included metaphors and imagery. Pain relief suggestions came from several different methods such as the dial method, age regression, transforming the pain, moving the pain, nerve blocks, dissociation, and/or projecting into the future. Based on their particular needs additional suggestions were added to the session such as a sense of calm and well-being, better sleep, decreased appetite, improved mood, improved circulation, and/or decreased anxiety. Metaphors that were used included a hot air balloon, hang gliding, driving and watching the sunset, being in a movie theatre, climbing a mountain, writing in the book of life, and a healing pond. Additionally, suggestions of self-hypnosis were given during each session. These cues involved having the participant put their thumb and forefinger together to begin the process of relaxation and self-hypnosis. They were told this is the bodies cue to begin the process of hypnosis and all they had to do was intentionally put their thumb and forefinger together. Session length varied, but in general lasted for 45 minutes.

All hypnosis sessions were unstructured with the exception of the progressive muscle relaxation. An example of a hypnotic session that I wrote is provided in Appendix L. This is not an exact duplicate of what occurred in session, but it is close nonetheless.

Following the hypnosis session, the participant rated the present pain again on the Posthypnotic Pain Rating Scale. The hypnosis session was briefly discussed to find out what the participant liked or disliked for our next session. They were then given their next weeks DPRS and scheduled for their next appointment. Total time was one hour to one hour thirty minutes.

### *Meeting 5*

#### *Hypnosis Treatment Group*

The fourth Daily Pain Rating Scale was collected and participants were asked to complete the post-treatment McGill Pain Questionnaire. The investigator read the words in blocks to the participant and had them choose the words that best described their pain over the past week. Participants were asked to give their impressions of their experiences as a participant as well as whether they would recommend hypnosis as a treatment to others with similar pain. They were also asked to talk about changes that they noticed in their pain. Participants were given the hypnosis treatment group-debriefing sheet and the investigator talked with them regarding any questions they had at that time (see Appendix M). A check for \$100 was given to each participant along with a sheet that listed local resources for counseling in the area (see Appendix O). This meeting took approximately thirty minutes.

## *Meeting 2*

### *Control Group*

Approximately three weeks following their initial meeting, the investigator called the control participants to schedule their second meeting. The four weeks of Daily Pain Rating Scales were collected and discussed. Participants were asked to complete the second McGill Pain Questionnaire. The investigator read the words in blocks to the participant and had them choose the words that best described their pain over the past week. Participants were then debriefed on the study and they were told that they had been part of the waitlist control group for the study. All questions were answered and they were given the opportunity to participate in the treatment aspect of the study at that time. No control group participants chose to do the treatment aspect of the study despite being told that the treatment group was showing benefit from the hypnosis sessions. Participants were asked for their impressions of the study and any changes they thought it made in their pain. All control participants were given a check for \$40 along with a sheet that listed local resources for counseling in the area. This meeting took approximately one hour.

### *Post-experimental Inquiry*

Participants were seen several weeks to months after completion of the study and were eager to share how they were doing. This writer also continued to get e-mails from the doctors at CAMC to update me on participant's progress as the participants share their results with their physicians. This follow-up information will be presented in the results section.

## CHAPTER 4

### RESULTS

#### *Design*

A quasi-experimental research design was employed using an equivalent group, 2 x 2, repeated measures procedure (treatment, control x pretest, posttest). The within-subjects factors included pre to posttest for Pain Rating Intensity, Number of Chosen Words, and Present Pain Intensity on the McGill Pain Questionnaire. The mean intensity ratings pre to post on the Prehypnotic Pain Scale and the Posthypnotic Pain Rating Scale were also looked at and similarly for the Daily Pain Rating Scale. The between-subjects factor was group assignment.

#### *Analyses*

The Statistical Package for Social Sciences (SPSS) version 12.0 for Windows was used to analyze all data. Alpha was set as the standard  $p = .05$  level. Analysis of variance was used to test the hypotheses. The analyses are discussed by hypothesis.

#### *Descriptive Statistics*

All of the participants that volunteered for this study experienced phantom limb pain. Seventeen experienced both residual stump pain and phantom limb pain leaving 15% ( $n = 3$ ) of the sample without stump pain. The age of participants in this sample ranged from 32 to 70 years ( $M = 52.15$ ,  $SD = 10.85$ ). The mean age in this sample is similar to what was reported by Sherman et al. (1984;  $M = 51.4$ ). However, the age at

amputation was somewhat higher in this sample ( $M = 41.3$ ,  $SD = 18.87$ ) than in the Sherman et al. (1984) sample, which had a mean age of 25.7 years. The difference may be because their sample was comprised of mainly veterans of war with war related amputations. Similar to other studies, this study had an incidence of pain before amputation of 70% ( $n = 14$ ). Only 15% ( $n = 3$ ) reported their pain decreased over time and 70% ( $n = 14$ ) reported the pain was the same as when it began. As with Sherman et al's. (1984) survey of 5,000 amputees, this study also found that phantom limb pain was reported to occur between 20 ( $n = 6$ ) and 30 ( $n = 8$ ) days a month and hours per day varied between 4 and 24. No participants reported pain fewer than 20 days a month or fewer than 4 hours per day. Problems that exacerbated participant's residual stump and phantom limb pain included being more active (55%;  $n = 11$ ), bowel movement (50%;  $n = 10$ ), weather (35%;  $n = 7$ ), sex (30%;  $n = 6$ ), stress (15%;  $n = 3$ ), using prosthesis (10%;  $n = 2$ ), bumping their stump (10%;  $n = 2$ ), and using a wheelchair (10%;  $n = 2$ ). Three participants (15%) were not sure what contributed to their pain and intensity.

Phantom sensations, other than pain, were also reported by all but one participant. Table 2 shows the percentage of amputees experiencing the non-painful sensations along with the location at which they experience the sensations and a description of the sensation. All descriptions have been compiled. Thus, if more than one participant said it felt like pressure it was only represented once in the table. Phantom limb pain is also depicted in this table for location and description. The participants may have sensations or phantom limb pain listed in more than one area. The intensity of non-painful phantom

Table 2

## Phantom Sensations and Phantom Limb Pain: Location and Descriptions

Location	Descriptions of Non-Painful Sensations	Phantom Sensations %	Descriptions of PLP	PLP %
Foot	Pressure Itching Numbness and Tingling Presence of foot Foot feels uncomfortable Standing in stirrup Like other foot Think I'm going crazy	45%	Shooting, Hot Burning, Itching Stabbing Shock Intense Wish I were dead Fast, Piercing Sharp Stabbing with knife	40%
Foot / calf	Makes me feel weird	5%	Sharp, Burning, Electrical	5%
Foot / toe	Pulling on toe nails	5%	Shooting	10%
Arch of foot	Tingling, Itchy, Throbbing Presence of arch	10%	Cramping Hot, Sharp	15%
Ankle	Bent upward Tingling	15%	Burning	15%
Calf	Leg is asleep	5%	Pounding	10%
Knee	Tingling Makes me anxious	5%	Throbbing, Painful	15%
Hand	Hand coming out of stump	5%	Sharp, Shooting, Tingling, Fingers drawn inward, Constant ache	5%
Whole leg	Twitching, Itching Presence of leg Throbbing Like foot is on ground Normal Coolness Pressure	25%	Burning, Shooting Numbness Tingling Stabbing with ice pick Sharp, Piercing Intense Electrical, Smashing	35%
Toes	Presence of toes	10%	Pain in middle toe Toe is being pulled off Cramping in toes Shooting	20%

sensations on the scale of 0 to 10 is reported in Table 3 using percentage of participants that endorsed the different levels of intensity. This table also shows the percentage of participants that endorsed the different levels of pain when asked what is the worst, usual, and least their phantom limb ever hurts. All participants responded with pain greater than a 7 at its worst. This is several points above the tolerable level (< 5) for participants to live functional lives. Scores ranging between four and five are reported to be easier for patients to handle and to accomplish their activities of daily living. This relates to their ability to work. This sample had 6 participants in the control group (30%) and 8 in the treatment group (40%) that considered themselves disabled due to their amputation and pain related issues. Only 3 (15%) were currently working. The other 3 participants were retired prior to the amputation, but considered themselves unable to function due to pain and other health concerns. When asked if the pain ever prevented them from doing things they wanted to do, 85% (n = 17) said it did interfere with their desired activities. Tables 2 and 3 are similar to the ones used in Sherman et al. (1984) for ease in data comparison.

Stump pain and phantom limb pain appears to be under-treated in this sample of amputees. Question 17J of the Amputee Questionnaire asks if the pain ever got bad enough to ask for treatment. Five controls (25%) and 9 treatment participants (45%) responded positively. Four of the control group participants that asked for treatment were given medication and one was given no additional help. Of the 9 treatment participants that responded positively, 5 were given medications, 2 never actually asked for treatment, 1 was taken off their medications, and for 1 nothing was done to help

Table 3

## Intensity of Phantom Limb Pain and Phantom Sensations

Intensity Rating (0 – 10 Scale)	What is the (Worst, Usual, Least) it ever hurts? 0 - 10			How strong are non-painful feelings? (0 – 10)
	Worst	Usual	Least	
0			0%	5%
1			20%	
2			30%	5%
3			25%	10%
4		5%	10%	
5		15%	10%	20%
6		50%	5%	20%
7	5%	15%		10%
8	25%	5%		15%
9	35%	5%		5%
10	35%	5%		10%

his or her pain. Of the 6 participants that reported the pain never got bad enough to ask for treatment, three reported that they were afraid to ask for help for fear of how they would be viewed or that when they tried to bring up the subject they felt their physician avoided the conversation or did not care (30%; n = 3). Two participants were told that they needed to seek psychological help and that the physician would no longer be dealing with their care. Only one participant reported that they were given an explanation of their phantom limb pain and the possible causes by their physician. It appears that this question (AQ17J) elicited both actual actions and thoughts about actions, such as participants actually asking their physician for help with their pain and just thinking or wishing to get help for their pain. Two people from the treatment group



responded that the pain got bad enough to ask for treatment, though they never actually asked for treatment. Table 4 shows the Chi-Square as well as the Fisher's Exact Test for question AQ17J (Did the pain ever get bad enough to ask for treatment?). The  $\chi^2$  seems to show a difference between groups on this question, but with Fisher's Exact Test, it appears to show the groups as similar.

Participants (80%; n = 16) reported that medication was the most helpful treatment for both stump and phantom limb pain. Pain in the stump was reportedly better controlled with medication, but the medication was found to help take the "edge" off the phantom pain. Twelve of the participants (60%) took medications that include taking narcotics and six were participants in the control group. The other participants (n = 4) took over-the-counter medications and/or Neurontin (anticonvulsant), which is used to treat nerve pain. It is unknown how many other treatments these participants have actually been tried on through the years, as this sample appeared hopeless that anything would help. Currently, many (n = 12) were utilizing treatments thought of as alternative or non-traditional such as herbal remedies, massage, creams, whirlpool baths, heating pads, and acupuncture. Massage/rubbing their stump (30%; n = 6) was listed as the next most helpful thing for their pain. Similarly, it was more helpful for stump pain than phantom limb pain. Physical therapy was thought to be helpful only part of the time and, generally, when their pain was related to difficulties ambulating. Other treatments that were tried included Biofreeze ointment, whirlpool, TENS, nerve blocks, and exercise and only the nerve block was reported to be helpful for stump pain. The most commonly cited treatment recommended by physicians was hitting/tapping

Table 4

Did the Pain Ever get bad Enough to ask for Treatment

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.810(b)	1	.051		
Fisher's Exact Test				.141	.070

a Computed only for a 2x2 table

b 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.00.

their other leg/stump when they experience phantom limb pain. Of the 12 participants that reported this, only 3 found any pain relief from hitting their other leg or stump repeatedly. All participants reported that there were no lasting benefits to any of the treatments tried for their pain.

As noted earlier, the Sherman et al. (1984) survey was comprised of mainly veterans dealing with war related amputations. This sample differs greatly; as seen in Table 5, 50% (n = 10) of the amputees in this sample lost their limb due to Diabetes Mellitus or diabetes complications. The other 50% included cancer, work injuries, accidents, and illness. It was expected that the majority of amputees would be diabetics due to the statistics for West Virginia on number of amputations related to diabetes.

Age in this sample had a range of 39 years with the minimum 31 and the maximum 70. Education was similar, ranging from 11 to 21 years, slightly higher than expected (M = 14.15, SD = 2.52 years). Time since amputation had a range of 6 months to 63 years (M = 131.45, SD = 213.65 months). Notably, participants reported their pain started directly following surgery (45%; n = 9), within one week (n = 3), between one week and one month (n = 3), approximately six months (n = 2), one year (n = 1), twenty-seven years (n = 1) and thirty-five years (n = 1) post-amputation. Once

Table 5

## Reason for Amputation

	Frequency	%
Cancer	2	10.0
Diabetes Mellitus	10	50.0
Knee Injury	1	5.0
Motorcycle	1	5.0
Motor Vehicle	2	10.0
Neurofibrometosis	1	5.0
Train	1	5.0
Tuberculo Osteomyelitis	1	5.0
Rock fell off wall	1	5.0
Total	20	100.0

the pain began, no participants reported that it went away. Only 3 (15%) stated that it decreased greatly, 3 said it increased, and the majority reporting it stayed the same (70%; n = 14). Differing from Sherman et al. (1984), this study did not have any participants that reported continuous phantom limb pain. Three did report that it would stay for days at a time, but would eventually recede. Most reported their pain as lasting for hours (n = 8). This may mean that the pain lasted for hours and then went away only to return for unknown reasons the next hour. One reported the pain lasts seconds to minutes, six reported their pain lasting seconds to hours, and two reported their pain as lasting minutes to hours.

Pain prior to amputation is thought to be a major contributor to pain after amputation according to the Somatosensory Pain Memory Model. This sample had 14 (70%) participants with pain before their amputation, which closely matches data reported by Sherman et al. (1984). When asked if the phantom limb pain was similar to the pain experienced before their amputation two participants said “no,” one participant

said “unsure,” and eleven (55%) said it did match their previous pain. The Amputee Questionnaire asked them to report if their current pain was also similar in location and quality as the previous pain. Ten participants (50%) said “yes” their current pain was in a similar location as their pain before amputation. The other participants responded with “no” (n = 3) and “unsure” (n = 1). Similarly for quality, 11 (55%) participants responded “yes,” 2 responded “no,” and 1 responded “unsure.”

When participants were asked if their phantom limb ever felt twisted or contorted 80% (n = 16) responded positively. Table 6 lists all of the responses by group that participants reported. When asked if they felt their phantom limb shrinking or changing shape (telescoping), 40% (n = 8) responded yes. Of these, 5 participants were in the treatment group. The descriptions of their experience of telescoping are also listed in Table 6.

Stump pain is also a significant problem with limited treatments available. In this study, all but 3 participants reported problems with their stump. All ten-treatment participants had stump pain. Stump pain was frequently described as constant, aching, heavy, burning, throbbing, shooting, stabbing, hot, and unrelenting. Thus, 11 participants (55%) reported experiencing stump pain 30 days a month. The other 6 participants reported 6, 10, 16, 20 (n = 2), and 25 days in pain. Hours of stump pain per day varied with 9 participants endorsing pain 24 hours a day. All others experienced stump pain 2, 4, 6 (n = 2), 8, 10 (n = 2), and 12 hours a day.

Multiple surgeries can add to the pain that is experienced and create problems with wearing a prosthetic. Thirty-five percent (n = 7) had two surgeries, 5% (n = 1) had three surgeries, and 5% had 12 surgeries on their stump. Multiple infections and

Table 6

## Individual Responses on Phantom Being Twisted and Telescoping

Does your phantom limb ever feel twisted or contorted?	
Control n = 8	Treatment n = 8
Toes get cramped and stuck pointed downwards. Big toe feels twisted or turned.	Middle toe feels twisted and pulled at times. Foot is not in the right position. Twisted around.
Toes cramp up and won't uncurl.	Foot feels turned at times.
Leg twists around. Toes cramp upwards.	Foot points downward and I can't straighten it.
Toes feel stuck in an awkward position. Ankle in weird position. Sort of turned.	Looks and feels like a hand with muscular dystrophy. Twisted and contorted.
Toes twisted upwards. My toes turn and cramp. I think I'm crazy sometimes when it happens. Foot is turned around. Can't move it. Frozen. Toes cramp downwards.	Feels like foot is turned the wrong way. Toes get cramped up and I can't relax them. Foot feels turned around. Sometimes cramped and can't move it.
	Feels like leg is going through the chair. Toes are locked curled up.
Does your phantom limb feel shorter or telescoped?	
Foot feels higher up leg 1-2 times a month.	Foot has moved up to end of my stump (above knee).
1-2 times a month foot is where knee should be.	Hand is at end of stump (above elbow).
Foot is where calf is 4+ times a month.	Foot is where the knee should be. 1-2 times a week foot is where knee should be. Feels like foot is up higher towards stump than normal on calf.

problems with healing add to the problem of pain. This sample had 25% (n = 5) that had problems with infections following their amputation.

Often amputees that experience chronic stump pain have the additional burden of being unable to wear a prosthetic for long periods of time or at all. Five participants

(25%) in the treatment group and 7 (35%) participants in the control group use a prosthetic regularly. Of those, 7 participants reported using a prosthetic on a daily basis. One used it once a week and another used it six times a week. The other 3 participants used it four times during the week. Hours of use varied from 1 hour to 16 hours a day with the 7 participants that use their prosthetic daily reporting 8 or more hours a day of use. All others used their prosthetic between 1 and 5 hours a day.

Participants (n = 14) reported that lack of use was due to the amount of stump and/or phantom limb pain they experienced while using their prosthesis. The pain is often intensified or brought on by use. This lack of use causes other problems, as amputees are often wheelchair bound, which can cause ulcers and sores. When participants were asked if they ever talked with a physician regarding their stump pain, twelve (60%) responded favorably, though 2 (10%) of those participants never actually talked with their physician. Many of the physician responses are unhelpful and often viewed by the participants as negative (see Table 7). Physicians' most common response seems to be to prescribe medications. Twelve of the participants (60%) reported that they currently take some sort of medication for their stump pain.

Participants (65%; n = 13) are also taking antidepressants for mood related issues. It is known that some antidepressants are prescribed for their ability to assist in pain management. When participants were asked if they were ever diagnosed with a psychological disorder, 12 participants (60%) responded they had problems with depression and one depression/anxiety. Though only 3 participants (15%) actually received assistance with the depression through formal counseling. All were given antidepressants, anticonvulsants, and/or anxiolytics by their physicians.

Table 7

## Individual Responses Regarding Receiving Help for PLP

What did your physician tell you could be done the PLP?	
Control n = 6	Treatment n = 6
You will always have stump pain. Everything is normal. Nerve damage.	Part of the healing process. Chronic normal pain. Pain is part of the process. Not to worry about it.
Neuropathy There is nothing wrong with your stump.	Never talked with doctor. Take Lortab. Normal process.
Nothing can be done.	Problems related to multiple surgeries and scar tissue.
Don't know. It will hurt until it stops. No problems currently. Scar tissue.	Bone deposits or scar tissue. Spend time massaging. Nothing can be done for it.

*Group Comparisons*

Participants were randomly assigned to the control and treatment groups following the hypnotizability testing. A card was pulled from a box that had either treatment or control written on it. This determined group assignment. Chi square tests were performed to see whether any significant differences between groups existed based on 11 criteria. It was expected that no differences between groups would be found and basically, no differences were found.

Gender was looked at ( $\chi^2 (1) = 2.22, p = .14$ ) and despite only 2 females being in the sample, no differences were found. Using Fisher's Exact Test, results showed there was no significant association between group status and gender,  $p = .47$ . No differences were found in wearing a prosthetic ( $\chi^2 (1) = .83, p = .36$ ), the location of the limb that was removed (Table 8;  $\chi^2 (1) = 2.20, p = .70$ ), having pain prior to surgery

Table 8

## Amputated Limb by Group

	Group	
	Control	Treatment
Left Above Elbow Amputation	0	1
Left Above Knee Amputation	2	3
Left Below Knee Amputation	3	3
Right Above Knee Amputation	2	2
Right Below Knee Amputation	3	1
Total	10	10

(Figure 2;  $\chi^2 (1) = .95$ ,  $p = .33$ ), regularly using a prosthetic device ( $\chi^2 (1) = .83$ ,  $p = .36$ ), and the reporting of stump ( $\chi^2 (1) = .39$ ,  $p = .53$ ) and phantom pain ( $\chi^2 (1) = 1.05$ ,  $p = .31$ ), seeking treatment for stump pain ( $\chi^2 (2) = 1.14$ ,  $p = .57$ ), and does pain prevent you from doing things ( $\chi^2 (1) = 3.53$ ,  $p = .06$ ). Seeking treatment for phantom limb pain was looked at and the Chi-square appeared to show significance ( $\chi^2 (1) = 3.81$ ,  $p = .05$ ); however, using Fisher's Exact Test no difference between groups was apparent ( $p = .14$ ).

Table 9 reported some particularly interesting findings based on the group comparisons. Age was the only variable on which there was a significant difference between groups at pretest ( $t (18) = 2.62$ ,  $p = .018$ ). Control group members were older than treatment participants were. All other areas appeared to be similar. For statistical purposes, the groups are considered equivalent on the reported aspects of pain at time 1.



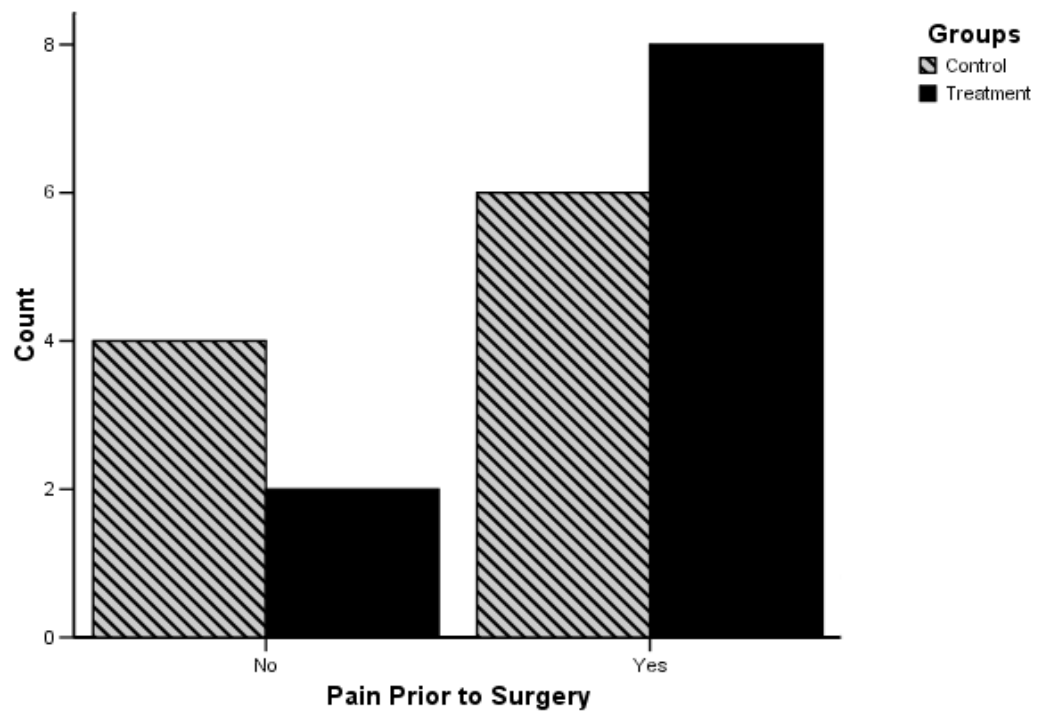


Figure 2. The number of participants in each group that reported pain prior to having their limb amputated.

Table 9

## Descriptive Information by Group

	Mean	SD	t	df	Sig (2-tailed)
Hypnotizability					
Control	3.70	1.16	-1.89	18	.076
Treatment	4.60	.97			
Age					
Control	57.70	8.67	2.62	18	.018
Treatment	46.60	10.24			
Years of Education					
Control	13.70	2.11	-.79	18	.439
Treatment	14.60	2.91			
Months since amputation					
Control	164.20	243.24	.68	18	.508
Treatment	98.70	186.58			
Present Pain Intensity					
Control	3.90	1.10	.65	18	.525
Treatment	3.60	.97			
Sensory 1-10 Total					
Control	29.50	11.21	-1.37	18	.187
Treatment	38.40	17.21			
Affective 11-15 Total					
Control	4.10	5.28	.00	18	1.000
Treatment	4.10	3.41			
Evaluative 16 Total					
Control	6.40	5.80	-.62	18	.541
Treatment	7.90	4.93			
Misc 17-20 Total					
Control	9.50	7.38	.37	18	.714
Treatment	8.40	5.74			
Pain Rating Index Total 1-20					
Control	49.50	25.27	-.81	18	.428
Treatment	58.80	26.02			
Present Pain Intensity-NCW					
Control	1.30	.48	-.74	18	.470
Treatment	1.50	.71			
Pain at Week 1 on DPRS					
Control	47.78	20.80	-.52	18	.606
Treatment	52.14	16.07			

## *Hypotheses Results*

### *Hypothesis 1 & 1b*

A 2x2 repeated measures analysis of variance (ANOVA) was computed to test hypothesis one, with the total McGill Pain Questionnaire (MPQ) score being the dependent variable (see Table 10). This score is the total Pain Rating Intensity score for all 20 blocks of the 78 pain descriptor words. The hypothesis predicts an interaction of Group and Time such that the two groups have similar scores at time 1, but significantly different scores at time 2. The Time by Group interaction was significant ( $F(1,18) = 18.66, p < .001$ ), supporting the hypothesis. The interaction effect is depicted in Figure 3.

Follow-up analyses were conducted using a paired samples t-test and a Bonferroni correction was employed to control for inflated alpha. Therefore, follow-up tests were considered statistically significant based on a cut off of  $p = .025$ . The results indicated that (a) the treatment group mean at posttest ( $M = 10.10, SD = 6.28$ ) was significantly lower ( $t(9) = 5.83, p < .001$ ) than at the between group mean at pretest ( $M = 58.80, SD = 26.02$ ) and (b) the control group mean ( $M = 46.40, SD = 14.67$ ) did not differ significantly ( $t(9) = 0.48, p = .64$ ) from the control groups mean at pretest ( $M = 49.50, SD = 25.27$ ). Independent t-tests were conducted and posttest scores on the MPQ were found to be significantly different based on group ( $t(18) = -7.19, p < .001$ ). The treatment group total scores were lower than the control group scores.

The main effect was not predicted in the hypotheses, but shows a trend toward significance ( $p = .074$ ). The main effect of group is the average of the pre and posttest means to see if they are different regardless of the treatment.

Table 10

Results of ANOVA for Hypothesis 1 &amp; 1b: DV MPQ Total Score

Source	Sum of Squares	df	Mean Square	F	Sig.
Within-Ss Effects					
Time	6708.10	1	6708.10	24.08	.000
Time * Group	5198.40	1	5198.40	18.66	.000
Error (time)	5015.50	18	278.64		
Between Ss Effects					
Group	1822.50	1	1822.50	3.60	.074
Error (group)	9113.90	18	506.33		

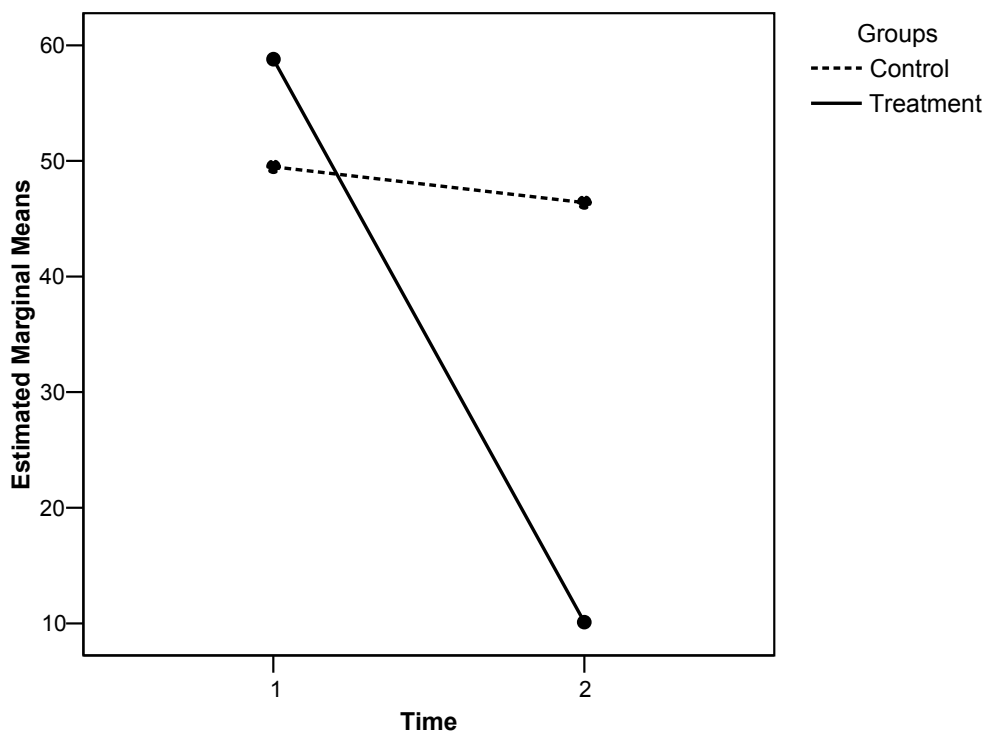


Figure 3. Hypotheses 1 & 1b are depicted showing the significant interaction effect of time by group for the Pain Rating Intensity score on the MPQ.

### *Hypothesis 2 & 2b*

A 2x2 repeated measures analysis of variance (ANOVA) was computed to test hypothesis two, with the Number of Chosen Words on the MPQ being the dependent variable (see Table 11). This score is the total Number of Chosen Words score for all 20 blocks of the 78 pain descriptor words. The interaction is based on similar scores between the control and experimental groups at time 1, but significantly lower scores at time 2 for the experimental component to the control group. The hypothesis predicts an interaction of Group and Time such that the two groups have similar scores at time 1, but significantly different scores at time 2. The Time by Group interaction was significant ( $F(1,18) = 25.60, p < .001$ ), supporting the hypothesis. The interaction effect is depicted in Figure 4.

Follow-up analyses were conducted using a paired samples t-test and a Bonferroni correction was employed to control for inflated alpha. Therefore, follow-up tests were considered statistically significant based on a cut off of  $p = .025$ . The results indicated that (a) the treatment group mean at posttest ( $M = 5.70, SD = 3.27$ ) was significantly different ( $t(9) = 6.49, p < .001$ ) than the between group mean at pretest ( $M = 23.50, SD = 9.32$ ) and (b) the control group mean at posttest ( $M = 19.20, SD = 3.26$ ) did not differ significantly ( $t(9) = -.04, p = .965$ ) from the control group mean at pretest ( $M = 19.10, SD = 8.08$ ). Independent t-tests were conducted and posttest scores on the MPQ number of chosen words were found to be significantly different based on group ( $t(18) = -9.36, p < .001$ ). The treatment group total number of chosen words were significantly less than the control group number of chosen words.

Table 11

Results of ANOVA for Hypothesis 2: DV NCW on MPQ

Source	Sum of Squares	df	Mean Square	F	Sig.
Within-Subjects Effects					
Time	783.23	1	783.225	25.03	.000
Time * Group	801.03	1	801.03	25.60	.000
Error (time)	563.25	18	31.292		
Between Subject Effect					
Group	207.03	1	207.03	3.73	.069
Error (group)	997.85	18	55.44		

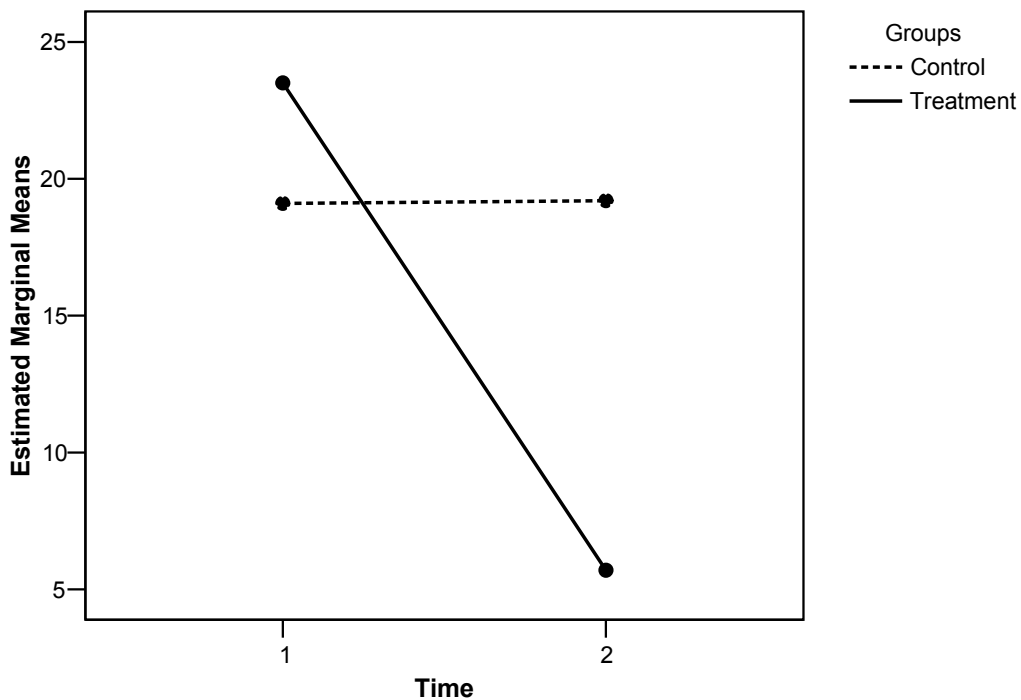


Figure 4. Hypotheses 2 & 2b are depicted showing the significant interaction effect of time by group for the Number of Chosen Words score on the MPQ.

The main effect was not predicted in the hypotheses, but shows a trend toward significance ( $p = .069$ ). The main effect of group is the average of the pre and posttest means to see if they are different regardless of the treatment.

### *Hypothesis 3 & 3b*

A 2x2 repeated measures analysis of variance (ANOVA) was computed to test hypothesis three, with the Present Pain Intensity on the MPQ being the dependent variable (see Table 12). The score on the PPI ranges from 0 to 5 and measures participants pain at the moment. The significance shows that pain recorded by participants at time 2 (posttest) was less for the treatment group than for the control group. The groups were similar at time 1. The interaction is based on similar scores at time 1, but significantly different scores at time 2. The hypothesis predicted a significant interaction effect of Time by Group. The Time by Group interaction was significant ( $F(1,18) = 17.82, p < .001$ ), supporting the hypothesis. The interaction effect is depicted in Figure 5.

Independent t-tests were conducted and posttest scores on the MPQ PPI were found to be significantly different based on group ( $t(18) = -5.73, p < .001$ ). The treatment group Present Pain Intensity scores ( $M = 1.30, SD = .82$ ) were significantly less than the control group Present Pain Intensity ( $M = 3.60, SD = .97$ ).



Table 12

Results of ANOVA for Hypothesis 3: DV PPI on MPQ

Source	Sum of Squares	df	Mean Square	F	Sig.
Within-Subjects Effects					
Time	16.90	1	16.90	30.12	.000
Time * Group	10.00	1	10.00	17.82	.001
Error (time)	10.00	18	.56		
Between Subject Effect					
Group	16.90	1	16.90	12.84	.002
Error (group)	23.70	18	1.32		

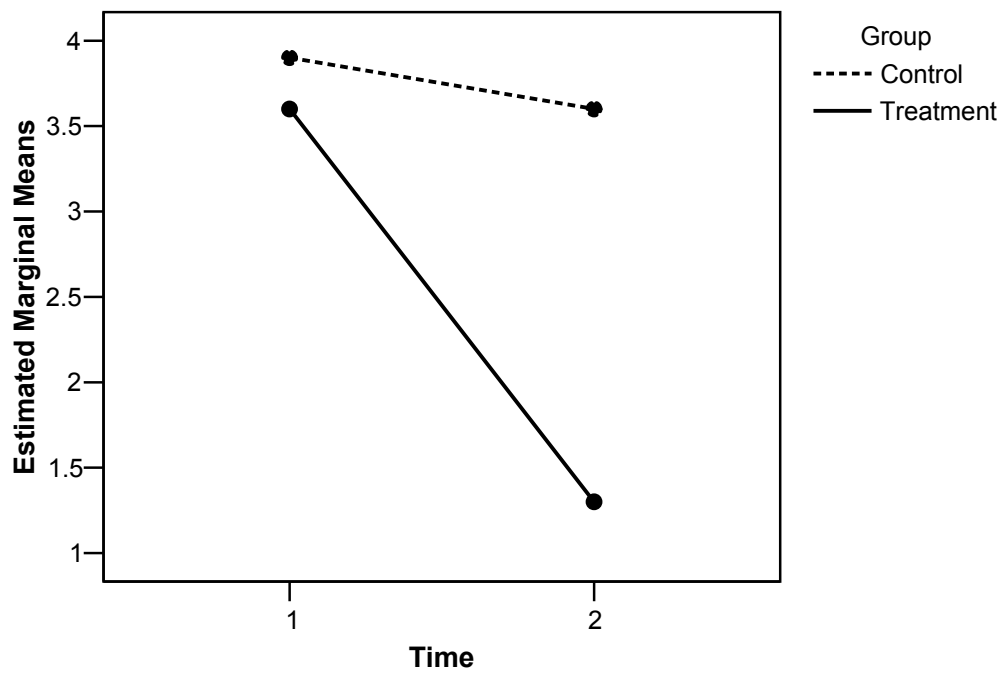


Figure 5. Hypotheses 3 & 3b are depicted showing the significant interaction effect of time by group for the Present Pain Intensity score on the MPQ.

*Hypothesis 4 & 4b*

A 2x2 repeated measures analysis of variance (ANOVA) was computed to test hypothesis four, with the pain intensity on the Daily Pain Rating Scale being the dependent variable (see Table 13). Pain was rated between 0 and 100 on a daily basis. The hypothesis predicted a significant interaction effect of Time by Group. The Time by Group interaction was significant ( $F(1,18) = 35.31, p < .001$ ), supporting the hypothesis that the treatment group would have significantly lower mean scores on their last recorded week on the DPRS. The interaction effect is depicted in Figure 6.

Independent t-tests were conducted and the last week scores on the DPRS were compared by group and found to be significantly different ( $t(18) = -5.16, p < .001$ ). The treatment group's total pain on the DPRS for the participants' last recorded week ( $M = 11.64, SD = 10.65$ ) was significantly less than the control groups last recorded week ( $M = 44.07, SD = 14.37$ ).

Table 13

Results of ANOVA for Hypothesis 4: DV Pain Scores on DPRS

Source	Sum of Squares	df	Mean Square	F	Sig.
<b>Within-Subjects Effects</b>					
Time	4887.54	1	4887.54	51.01	.000
Time * Group	3383.05	1	3383.05	35.31	.000
Error (time)	1724.56	18	95.81		
<b>Between Subject Effect</b>					
Group	1970.07	1	1970.07	4.81	.042
Error (group)	7371.92	18			

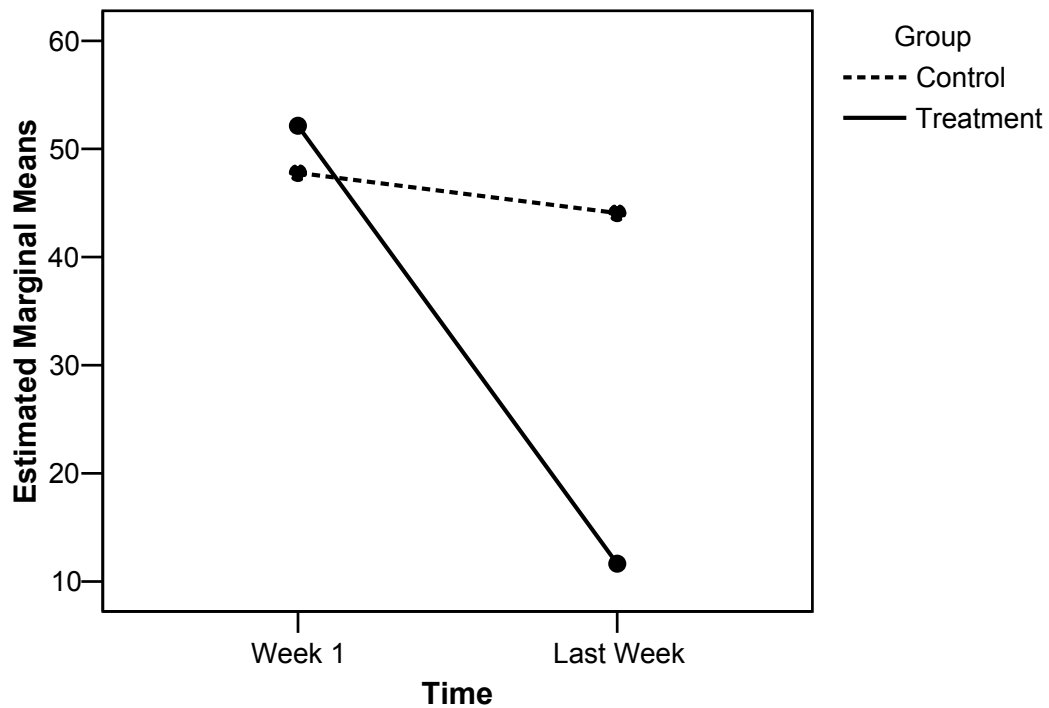


Figure 6. Hypotheses 4 & 4b have a significant interaction effect of time by group on the pain intensity ratings on the Daily Pain Rating Scale.

### *Hypothesis 5*

A paired-samples t-test was conducted to evaluate whether treatment participants showed an immediate decrease in their present pain ratings as measured by the Prehypnotic Pain Scale (PPS) and the Posthypnotic Pain Rating Scale (PPRS) during each of three sessions. The results indicated that the mean for prehypnotic pain at time 1, 2, and 3 was significantly different respectively from the means recorded on the post measures at time 1 ( $t(9) = 5.50, p < .001$ ), time 2 ( $t(9) = 7.60, p < .001$ ), and time 3 ( $t(9) = 4.66, p = .001$ ). Table 14 reports the means and standard deviations for each of the pairs. Figure 7 shows each of the three sessions plotted on a line graph.

Table 14

## Paired t-test Information for Hypothesis 5

	Mean	SD
Pair 1		
Prehypnotic Pain Scale Session 1	39.50	23.86
Posthypnotic Pain Rating Scale Session 1	2.40	4.72
Pair 2		
Prehypnotic Pain Scale Session 2	32.00	13.98
Posthypnotic Pain Rating Scale Session 2	1.20	3.16
Pair 3		
Prehypnotic Pain Scale Session 3	26.00	19.41
Posthypnotic Pain Rating Scale Session 3	2.00	4.22

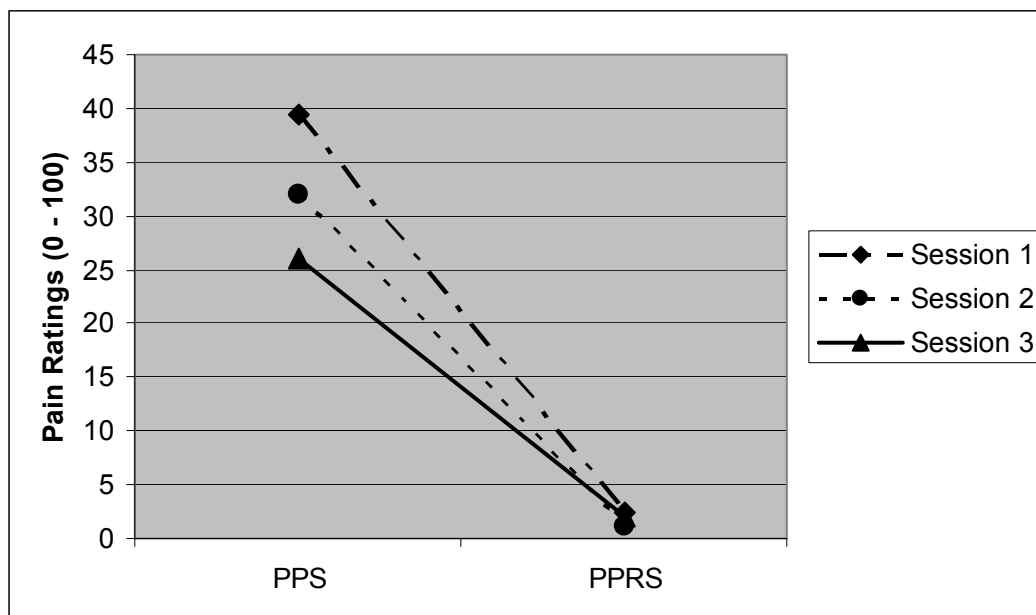


Figure 7. Hypothesis 5 results from the paired samples t-test. Differences were significant for each of the three pairs of Prehypnotic to Posthypnotic Pain Rating Scales.

### *Daily Pain Rating Scales*

Each participant was required to complete four weeks of DPRS and return the completed scales during their next visit. This was difficult for those with complicated medical issues as they were frequently sick, seeing multiple doctors during the week, and/or having problems obtaining transportation. The control group had a mean score of 4.20 (SD = .63) and the treatment group had a mean of 5.31 (SD = 1.07). The scores on the DPRS have been plotted for each participant based on their means for the individual weeks (see Figures 8 – 27).

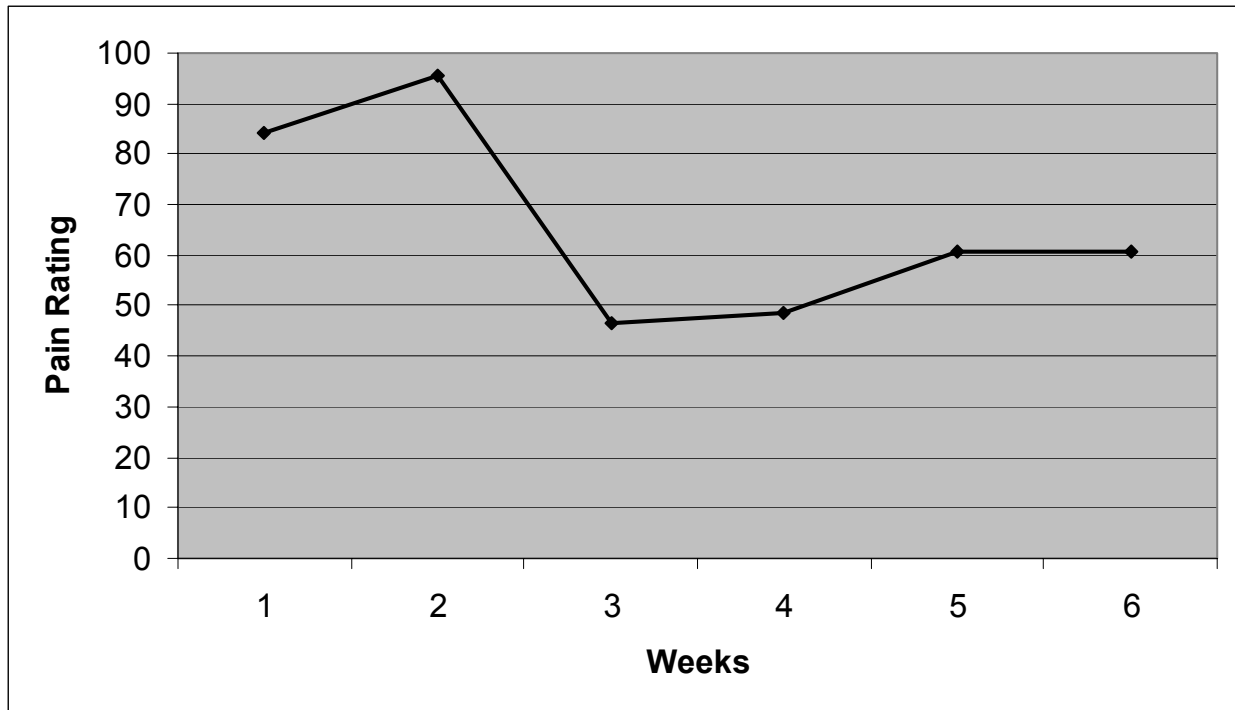


Figure 8. Control 1, rating pain over a period of six weeks on the Daily Pain Rating Scale.

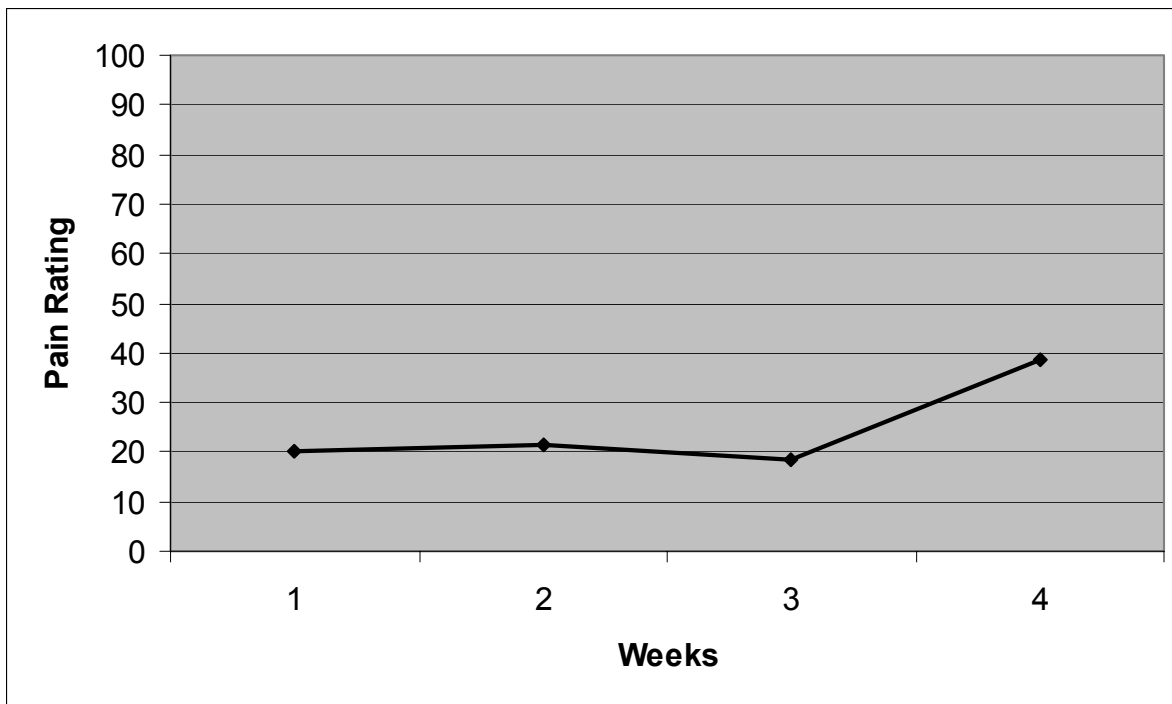


Figure 9. Control 2, rating pain over a period of four weeks on the Daily Pain Rating Scale.



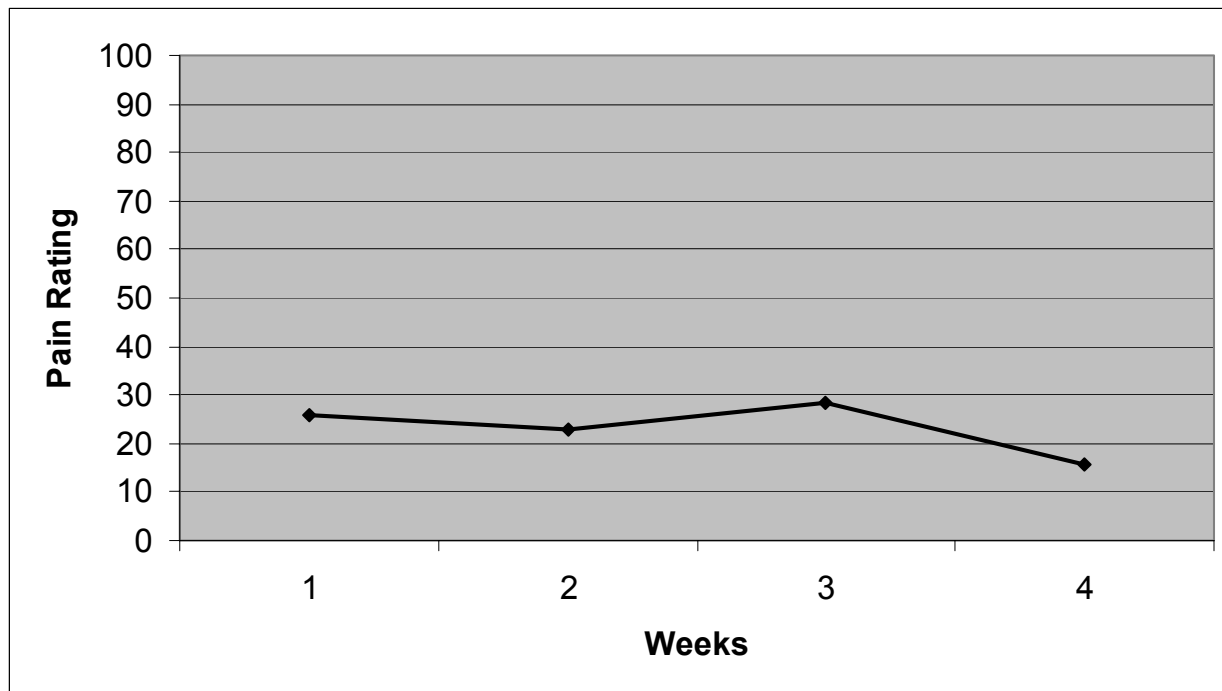


Figure 10. Control 3, rating pain over a period of four weeks on the Daily Pain Rating Scale.

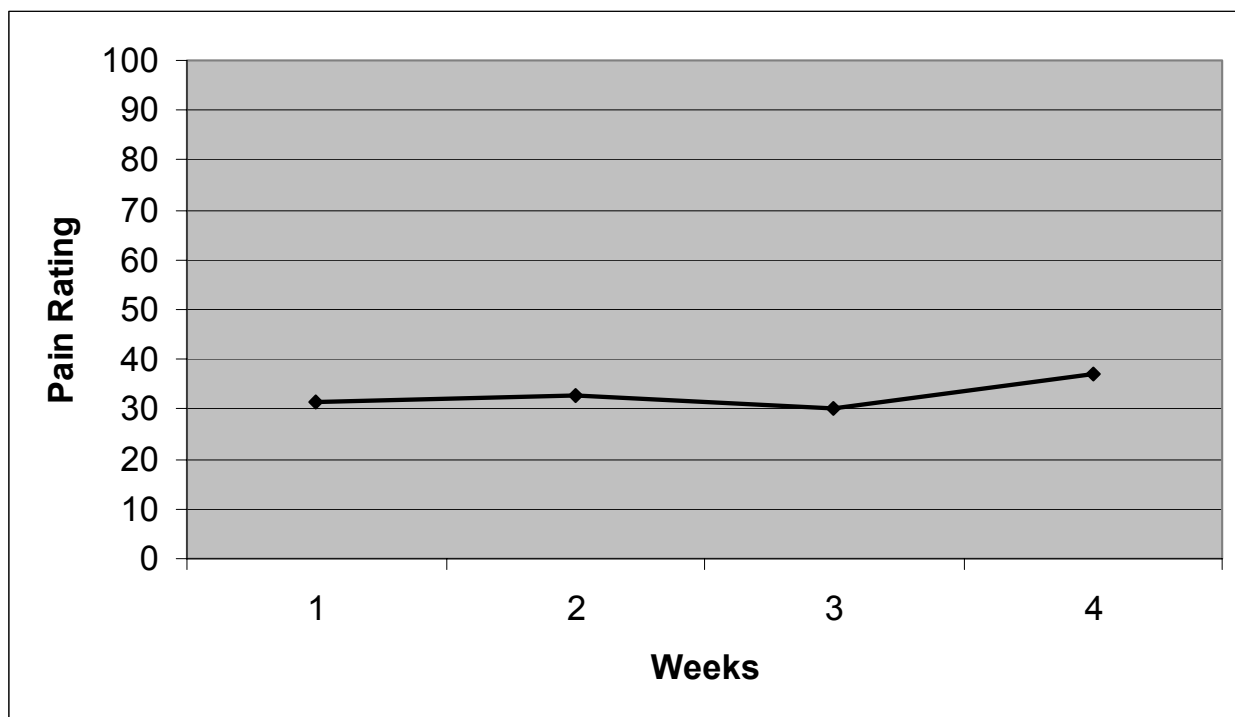


Figure 11. Control 4, rating pain over a period of four weeks on the Daily Pain Rating Scale.

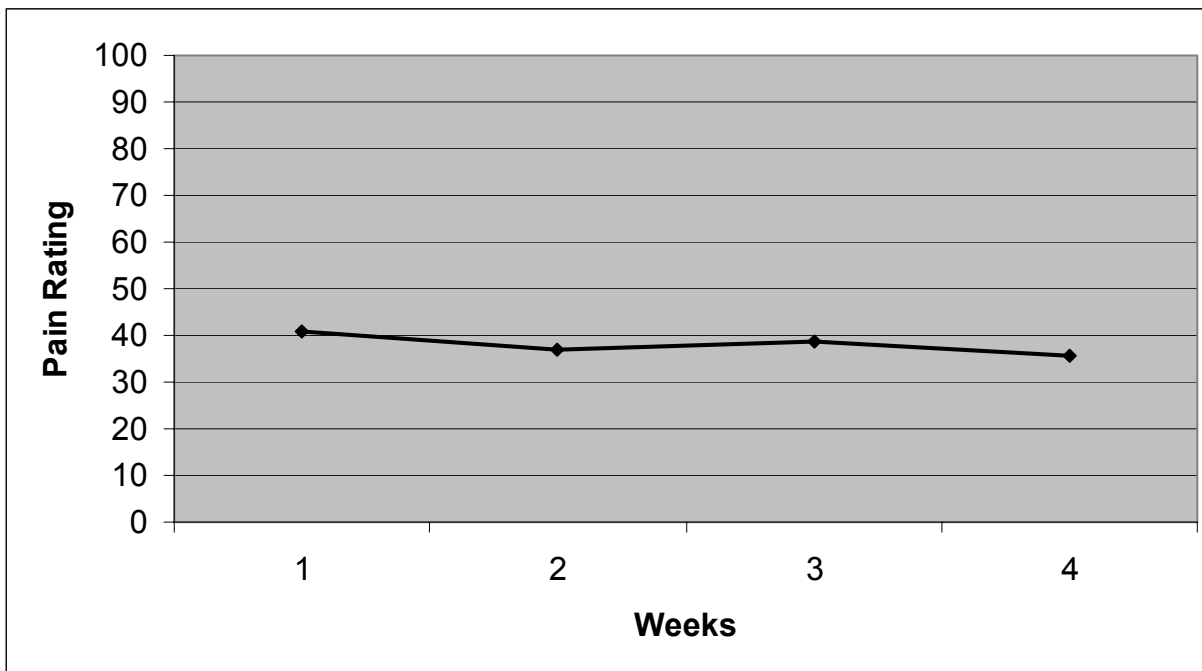


Figure 12. Control 5, rating pain over a period of four weeks on the Daily Pain Rating Scale.

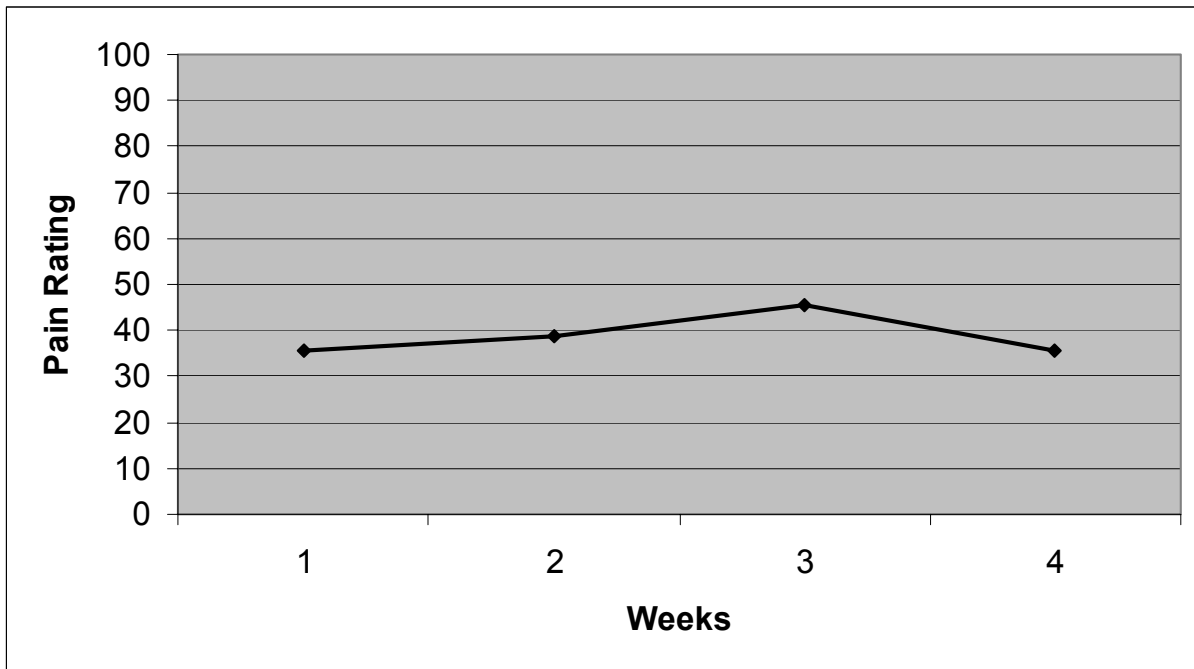


Figure 13. Control 6, rating pain over a period of four weeks on the Daily Pain Rating Scale.

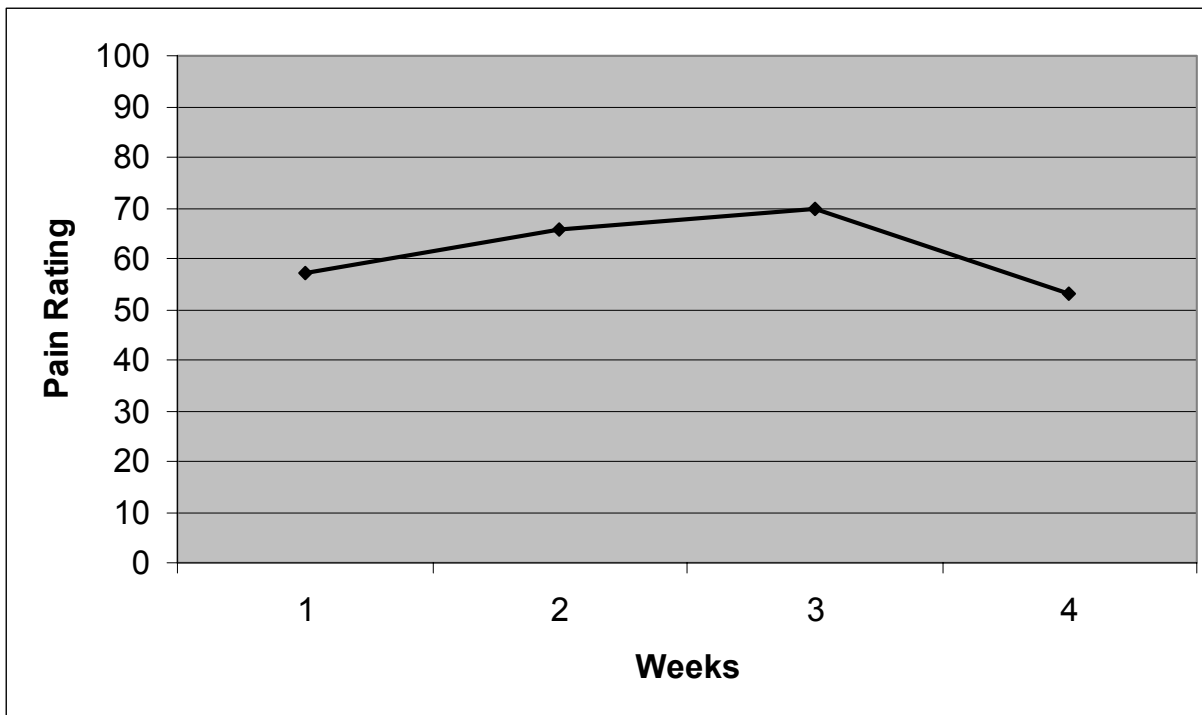


Figure 14. Control 7, rating pain over a period of four weeks on the Daily Pain Rating Scale.

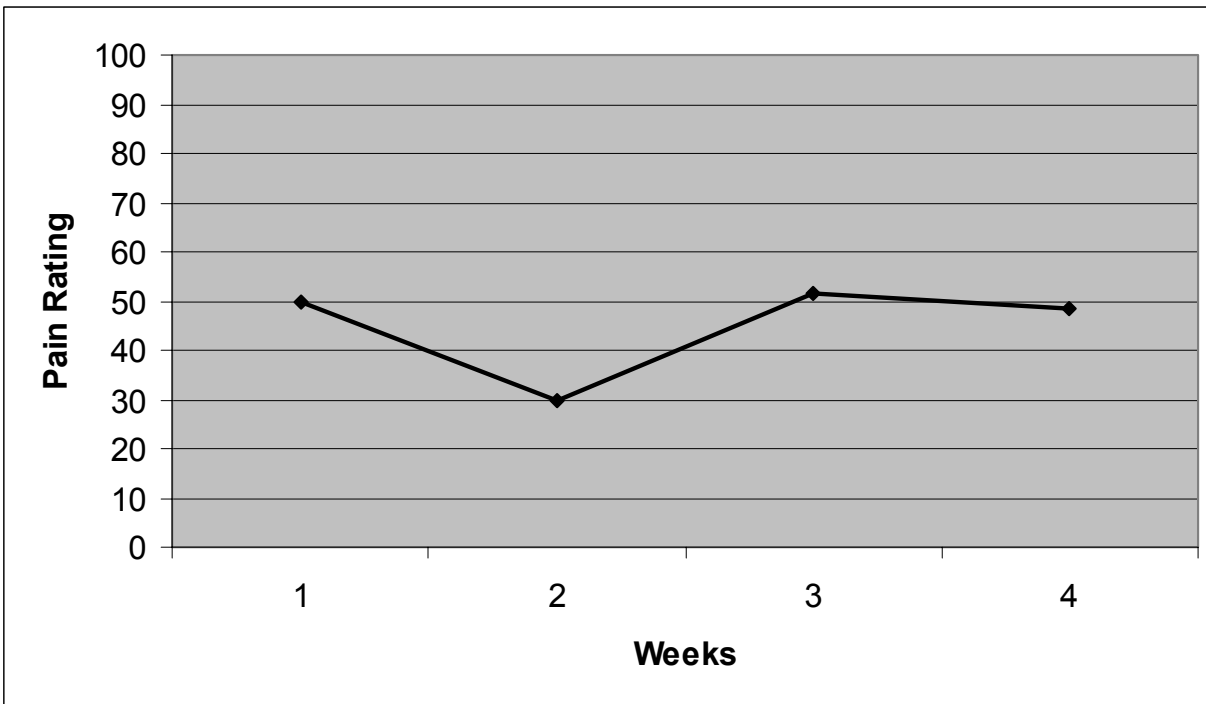


Figure 15. Control 8, rating pain over a period of four weeks on the Daily Pain Rating Scale.

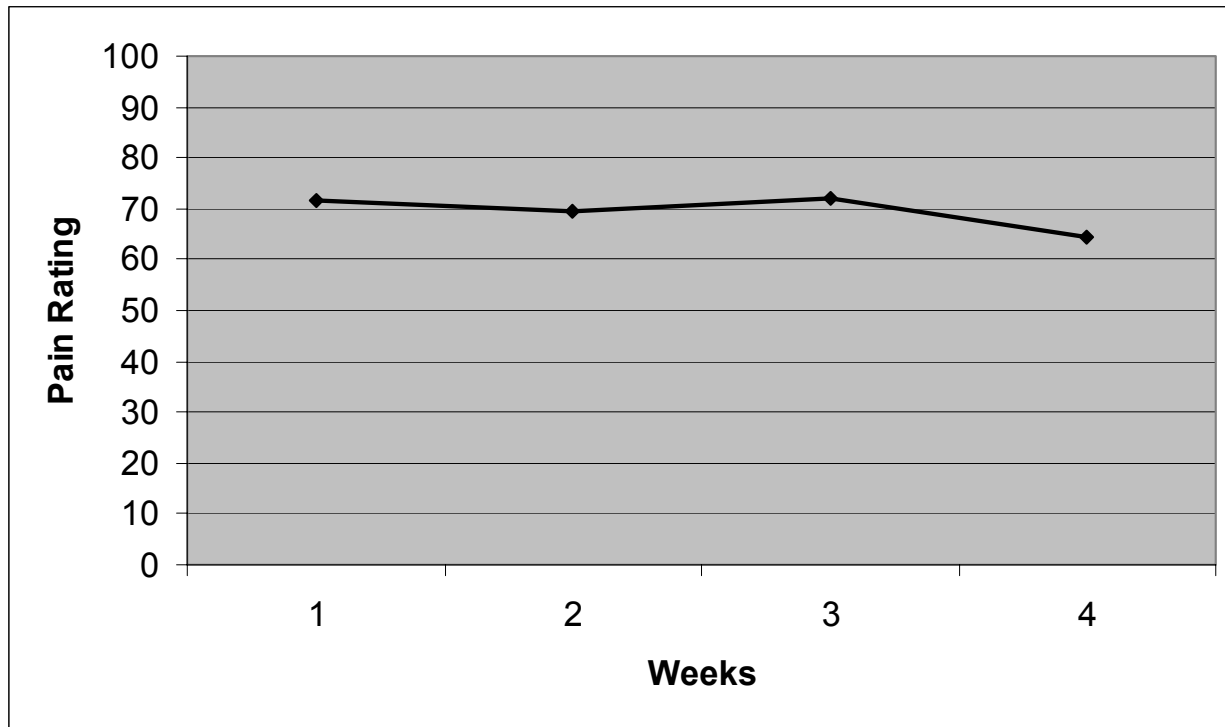


Figure 16. Control 9, rating pain over a period of four weeks on the Daily Pain Rating Scale.

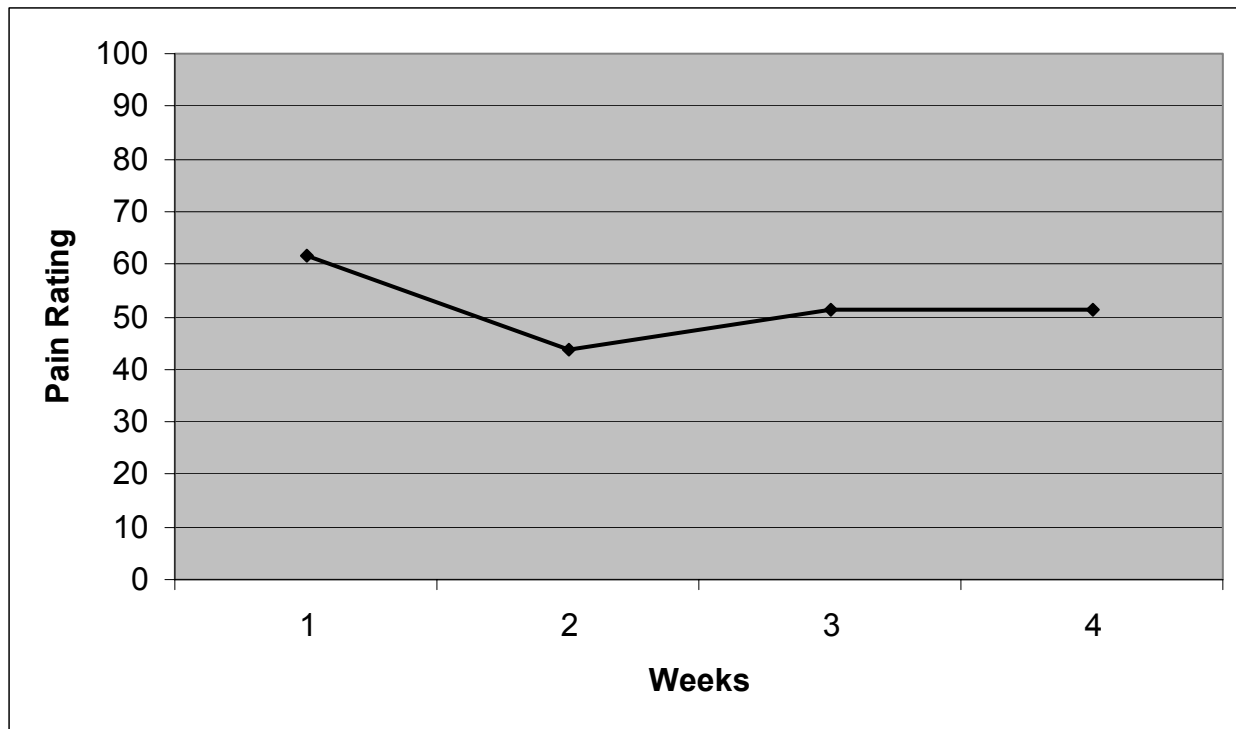


Figure 17. Control 10, rating pain over a period of four weeks on the Daily Pain Rating Scale.



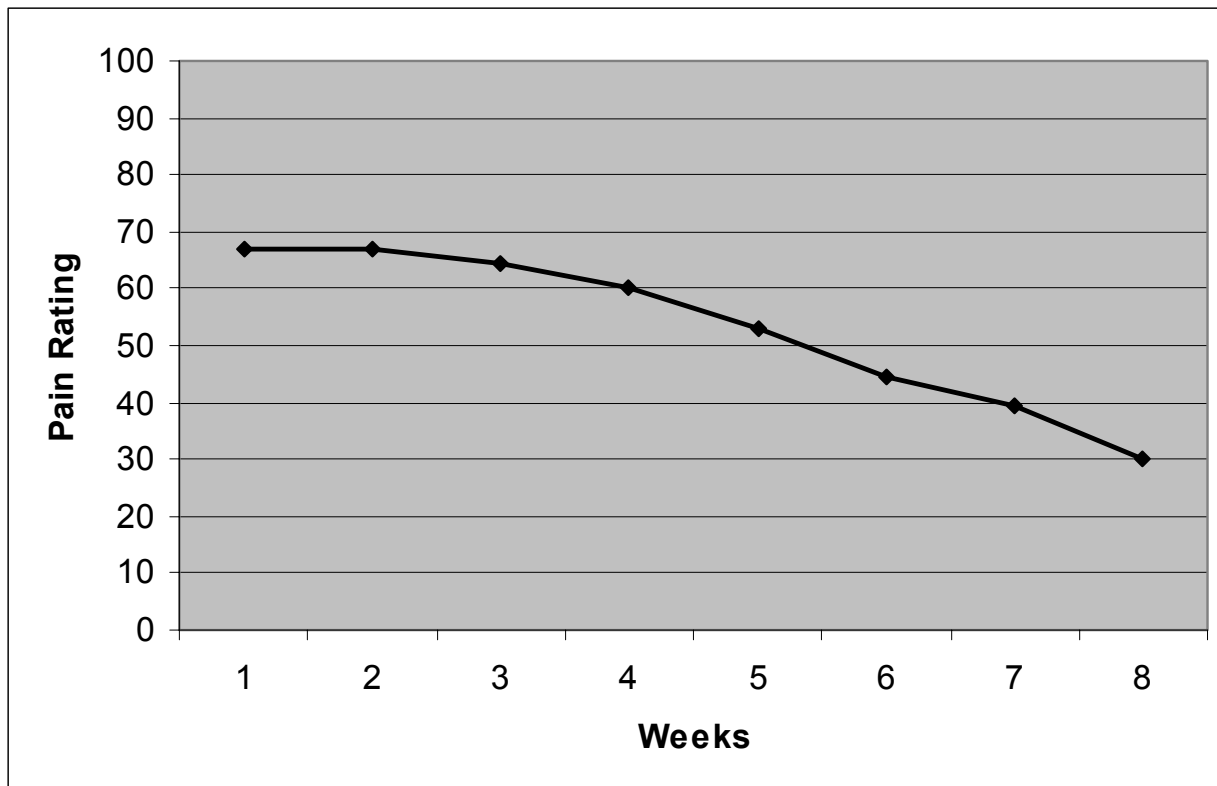


Figure 18. Treatment 1, rating pain over a period of four weeks on the Daily Pain Rating Scale.

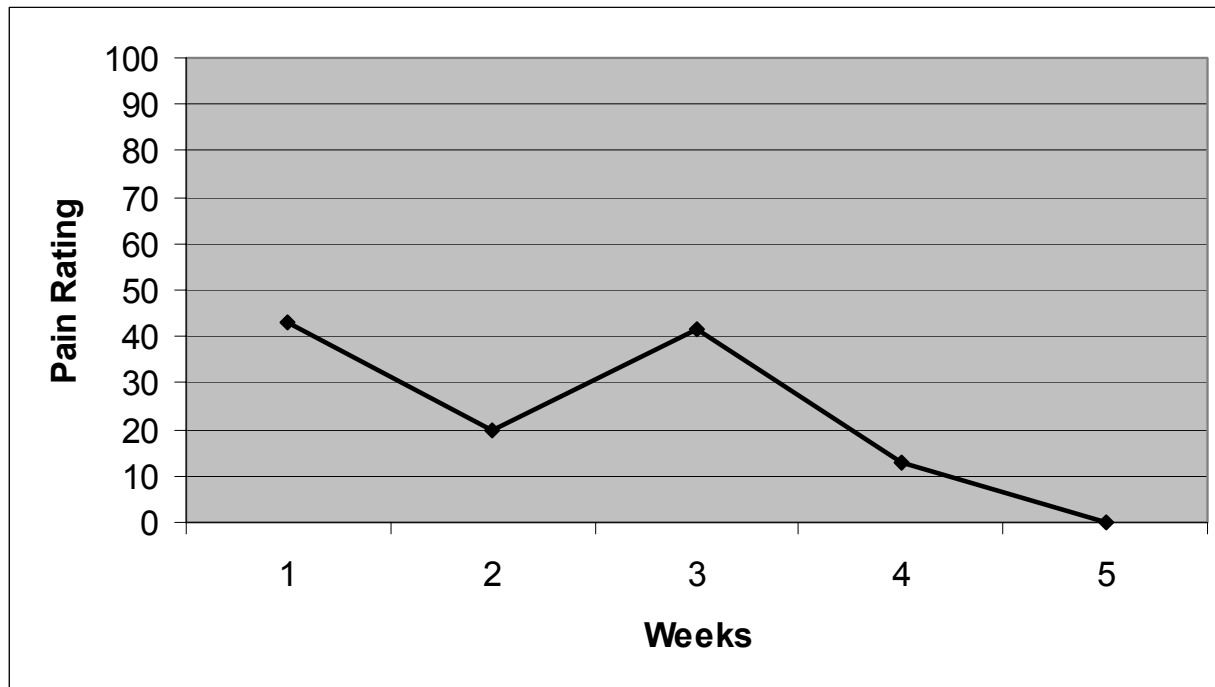


Figure 19. Treatment 2, rating pain over a period of five weeks on the Daily Pain Rating Scale.

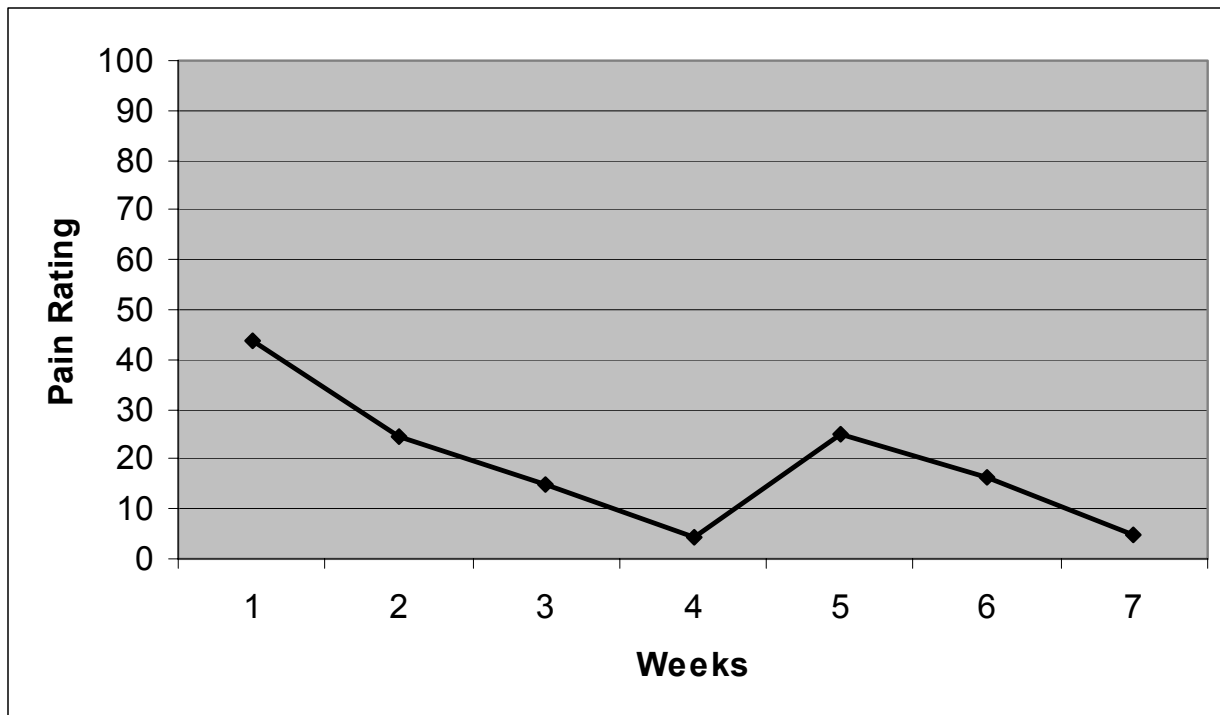


Figure 20. Treatment 3, rating pain over a period of seven weeks on the Daily Pain Rating Scale.

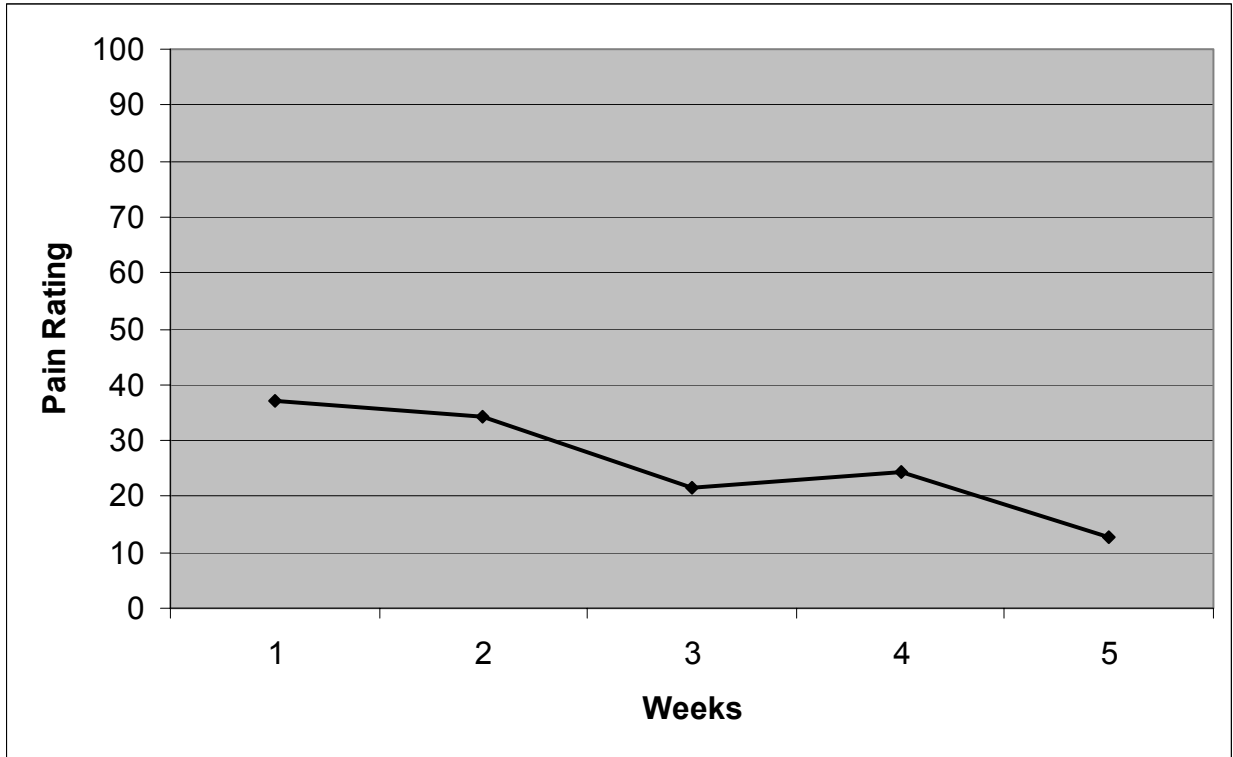


Figure 21. Treatment 4, rating pain over a period of five weeks on the Daily Pain Rating Scale.

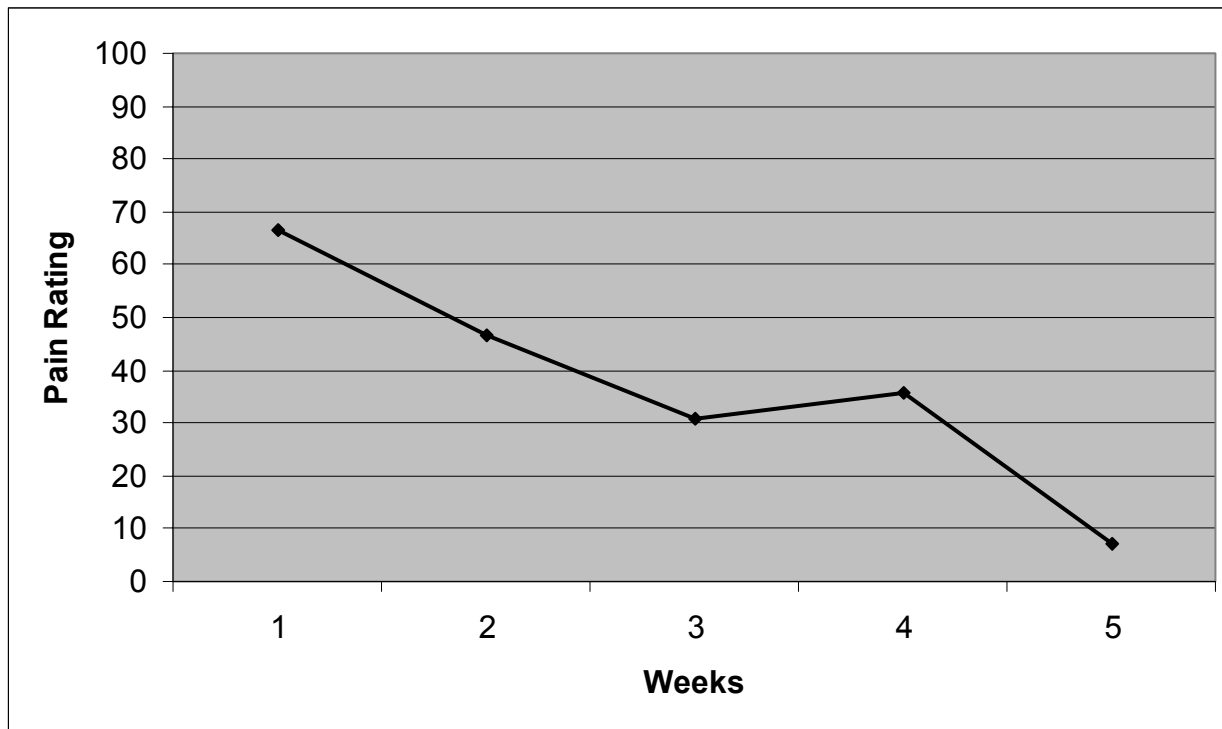


Figure 22. Treatment 5, rating pain over a period of five weeks on the Daily Pain Rating Scale.

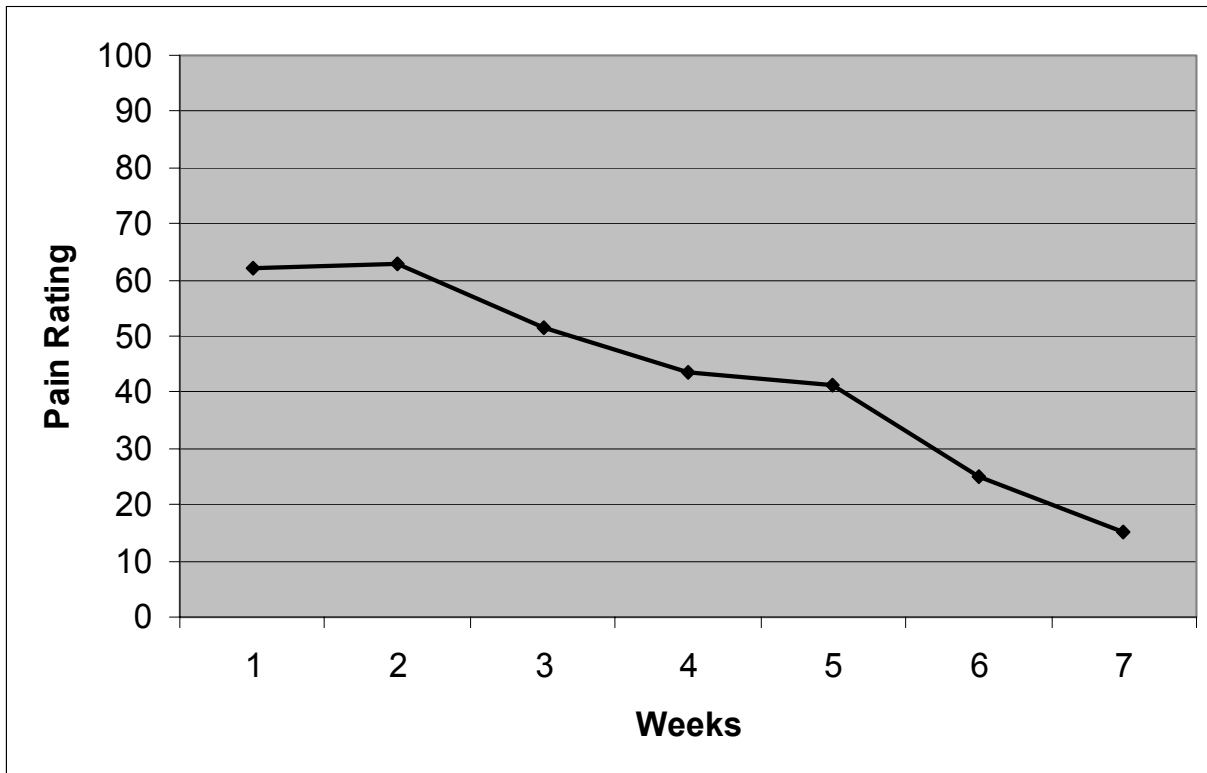


Figure 23. Treatment 6, rating pain over a period of seven weeks on the Daily Pain Rating Scale.

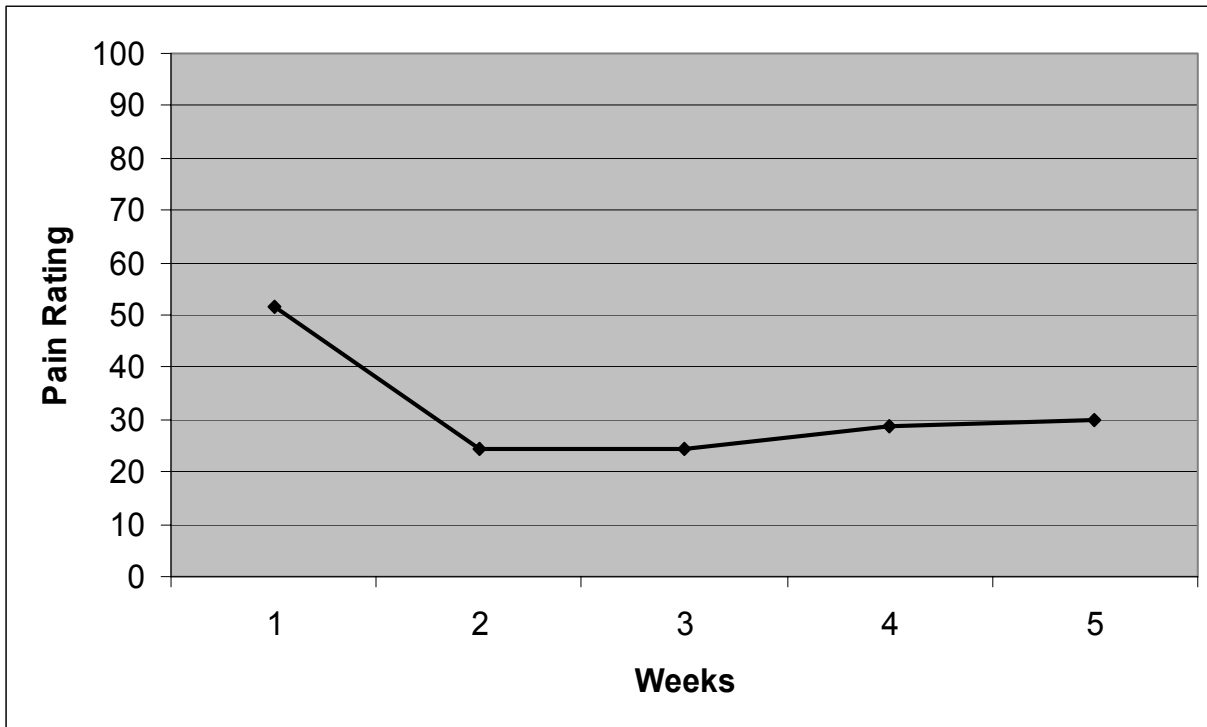


Figure 24. Treatment 7, rating pain over a period of five weeks on the Daily Pain Rating Scale.

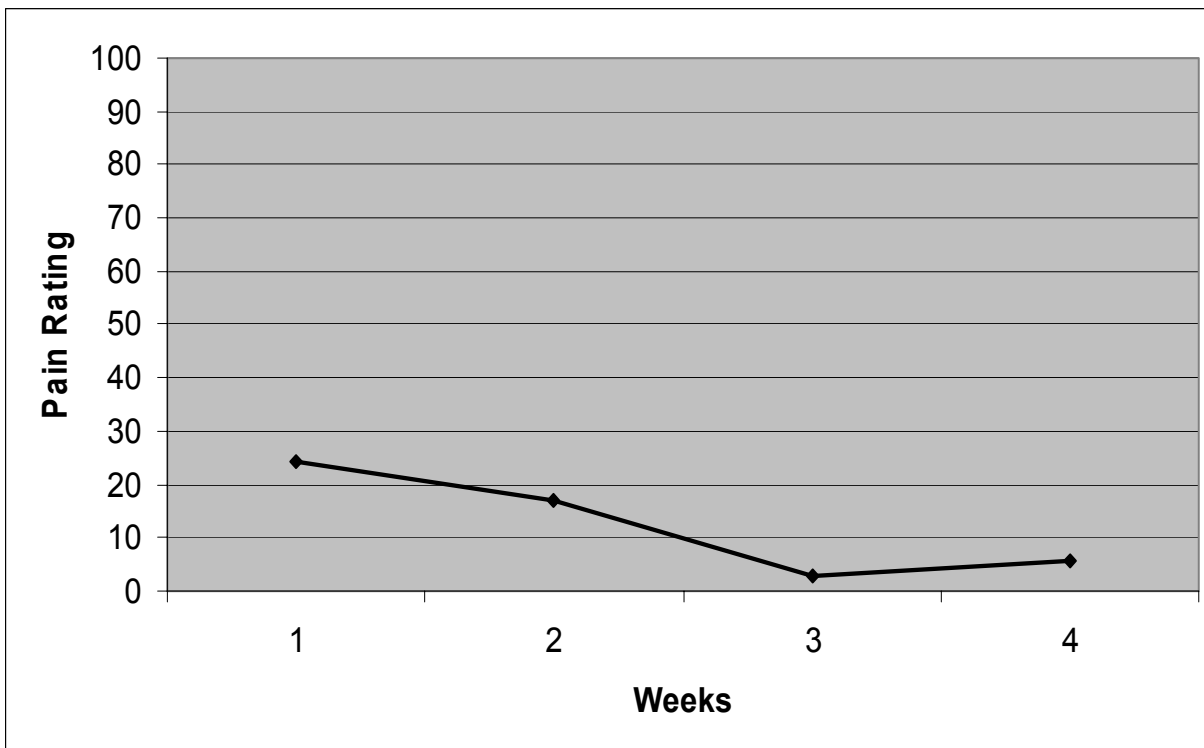


Figure 25. Treatment 8, rating pain over a period of four weeks on the Daily Pain Rating Scale.



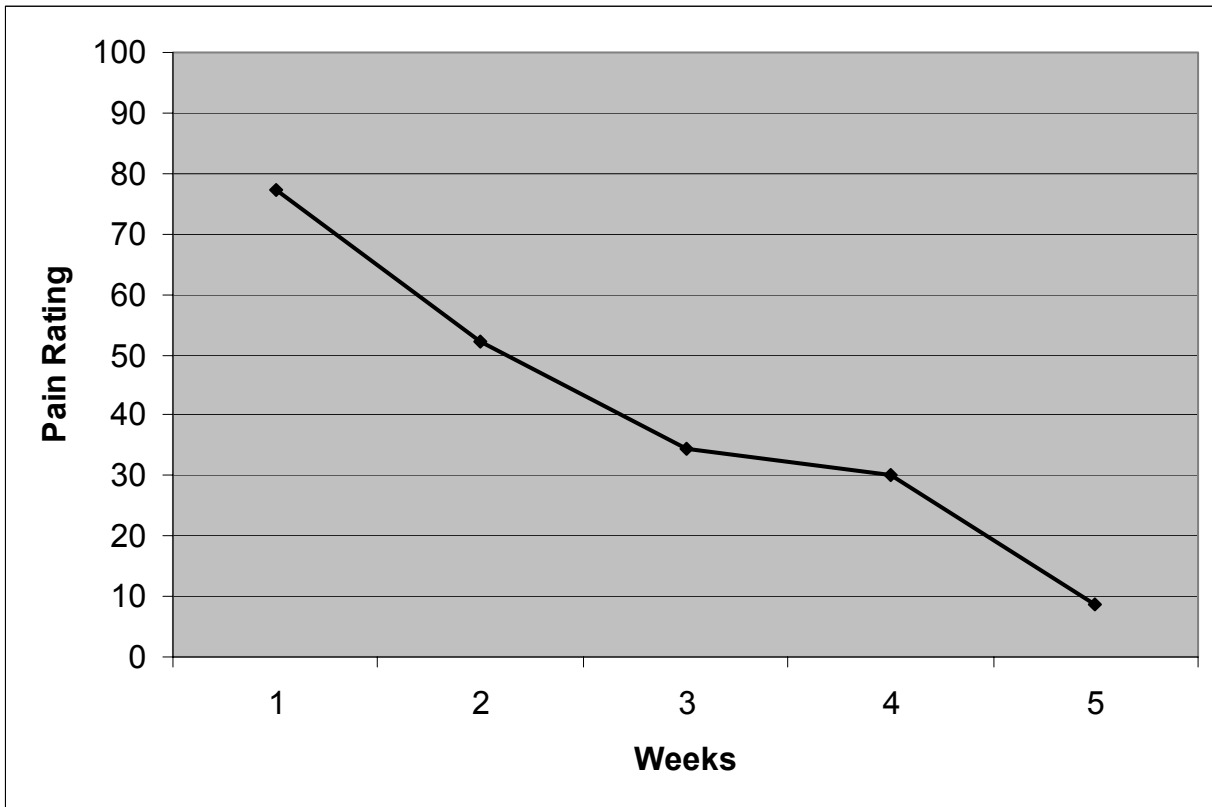


Figure 26. Treatment 9, rating pain over a period of five weeks on the Daily Pain Rating Scale.

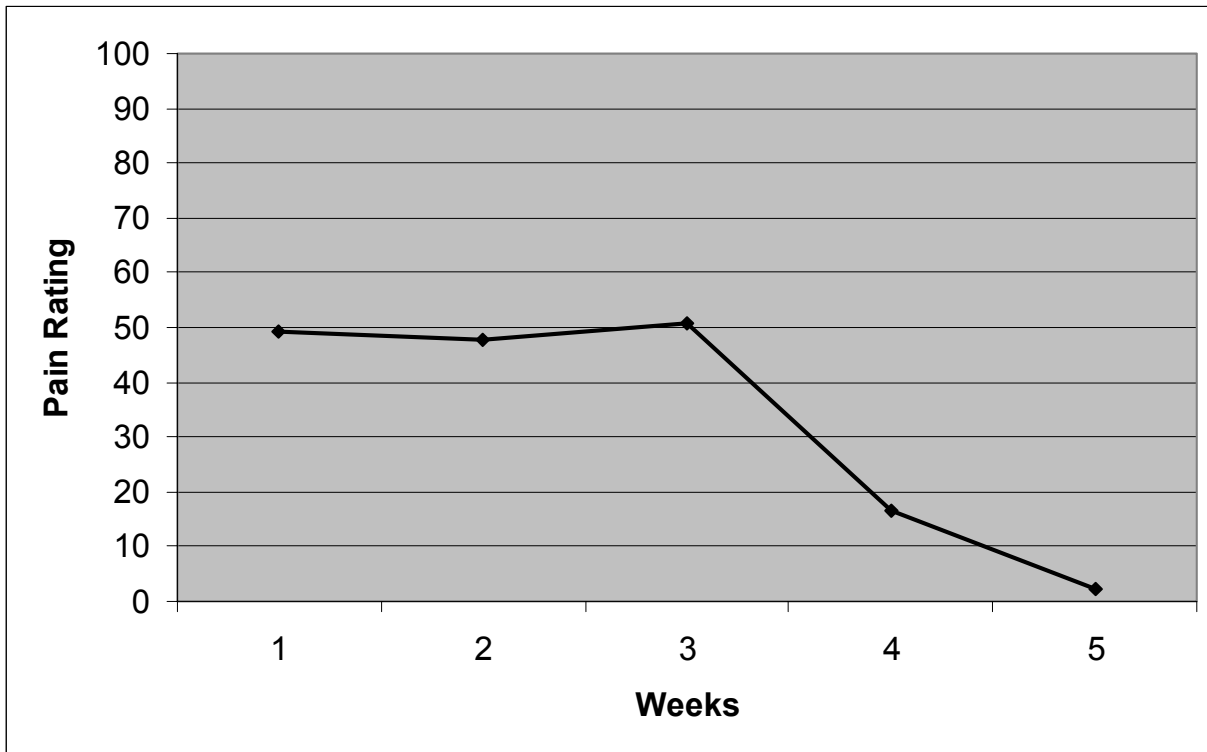


Figure 27. Treatment 10, rating pain over a period of five weeks on the Daily Pain Rating Scale.

### *Post-Experimental Inquiry*

No formal follow-up was scheduled; however, due to the primary investigators role within the hospital, participants were frequently seen through the amputee clinic, rehabilitation unit, or other areas of the hospital. Of the ten treatment participants, eight were seen informally or their physicians gave an update on how they were doing at their last appointment with them. All were seen or discussed at the 3-week to 1-month post-treatment mark. All participants in the treatment group reported they continued to be improved from their baseline and either maintained the improvements from their last session or were continuing to show improvements in their pain. Seven participants from the control group had contact with the investigator between 2-weeks and 6-weeks from their last session. All reported the pain continued to be intense, problematic, and they did not notice any change. One participant did note that the pain had worsened; however, he was undergoing surgery for a fracture to his other leg because of overuse. The physicians involved in this study were so impressed with the results that a formal follow-up at 6-months and 1-year is being planned.

## CHAPTER FIVE

### DISCUSSION

The results of the present study clearly support the effectiveness of an individualized, tailored, hypnotic intervention for reducing residual stump pain and phantom limb pain. Results indicated that with as few as three sessions, substantial as well as statistically significant benefits could be gained, which were maintained at follow-up. It is unclear how long these benefits will last. Informal follow-up at one month showed lasting changes for eight of the participants in the treatment group. No change was reported during informal follow-up for those seven participants in the control group.

The findings add to the literature on stump and phantom limb pain as well as inform the medical community regarding the potential for hypnosis to be considered a treatment for these problems. Several related areas will be covered in this chapter including the theoretical explanations of the findings, implications of the findings, issues related to the participants, usefulness of the questionnaires and scales in this study, hypnosis in the medical field, hypnotizability of participants, depression as related to amputees and pain, limitations of this research, and future research directions.

#### *Hypotheses*

For hypotheses 1, 2, and 3, it was expected that participants in the treatment group would show a decline in the Pain Intensity Ratings, Number of Chosen Words, and Present Pain Intensity as measured by the MPQ. The actual decline in pain ratings

for the treatment group is depicted quite clearly in the results. What could be seen is a, quite remarkable decline that occurs following the first session of hypnosis. The treatment group shows a difference from their week one to their last week on the DPRS of 20 – 70 points (Hypothesis 4). The control group daily pain ratings showed a non-significant decline from week one to their last week. This decline is from 1 – 10 points overall for most participants. This may be the placebo effect or actually show the normal change in pain intensity over time.

The MPQ was given favorable reviews by the participants as a pain measure. The 78 descriptors of pain seemed to give them a way to express their pain with new words. Participants seemed to understand the MPQ and were thoughtful in the words they chose as the experimenter read the scale to them. They seemed to ponder each block of words making sure they were choosing the correct ones. Words were reread until they made a choice and only a few people asked what “rasping” and “smarting” was. Both the Pain Rating Intensity and the Number of Chosen Words seemed to be an accurate reflection of their pain.

Hypothesis 5 predicted that the treatment group would show a decline from the Prehypnotic Pain Scale ratings to the post measure (PPRS). This was a significant finding. Participants came to their sessions in pain and following the hypnotic session they were virtually pain free when measured using the PPRS. The reported pain on each of the Prehypnotic Pain Scales decreased in ratings at each of the three sessions. This shows the trend of pain intensity declining over time ( $F(2) = 3.21, p = .064$ ). There was no difference in the pain ratings of the PPS when all of the pre measures were taken together and no differences were found when the three sessions of the PPRS

were looked at. Post ratings are all similarly at approximately a 3-point pain intensity on the 100-point scale.

No study to date has looked at hypnosis using a similar format as this research project. It is not accurate to generalize the findings from case studies and compare the results to this study. This study clearly demonstrates that hypnosis should be seriously considered as the potential pain management technique of choice for the amputee population and the treating physicians.

#### *Daily Pain Rating Scale Individual Explanations*

As the researcher it is easy for me to examine the data and understand why findings look or do not look a certain way. I found this to be true when I observed Figures 8 – 27, so it is worth taking an individual look at each of the majority of participant's overall scores that had fluctuations that could use elaboration of the Daily Pain Rating Scale.

*Control 1.* This participant was initially met while on the inpatient unit. He was referred to the study through his treating physician due to severe pain and stump spasms. While interviewing him, he would grab his stump and yell in agony as the pain would come on and then recede just as quickly. He filled out the TSQ and gave me details on his amputation as related to his diabetes. He was being tried on all sorts of narcotics and basically, the staff had gotten used to his screaming and yelling for more pain medications. He agreed to meet with me formally when he was released from the hospital.

During our next meeting several weeks later, I met with him and the pain was so severe it was difficult to complete the questionnaires or do the hypnosis. He appeared to be grabbing his other leg and not his stump when he screamed. When I questioned him he reported that the pain had moved to his other leg and was becoming more severe with time. He lifted his pant leg up and showed me where a heart patch had been placed on his ankle in the hopes of opening up the blood vessels in his leg. I knew immediately that his leg was severely infected. He told me that the physicians would not listen to him and that he did not think he needed to see a doctor. I argued profusely that he could lose his other leg or worse yet die if he did not go see his doctor. I then asked him to call his family in so I could tell them my concerns. I could see that they had been concerned about his pain as well and they assured me that he was going straight to the emergency room.

When I contacted him to follow-up, he had been admitted to the hospital and had to have surgery on his leg because of the infection. When he was released and he followed up with me, his pain had become much more tolerable. The pain that he had been experiencing was caused from the severe infection that he was experiencing, which at the time was rated at an 82 – 100 on the DPRS. You can see the pain dropped significantly once the infection was taken care of. A pain rating of 50 – 60 is probably a more accurate reading for his normal range of pain.

*Control 2.* This participant was recruited through the Amputee Clinic. He reported moderate levels of intermittent pain, but continued to function fairly highly. He spent the last week of the study vacationing and walked more than usual. He noted that his pain increased with the amount of walking that he did. Further, in order to have a

good fit using a prosthetic, amputees need to maintain the same amount of weight and activity. Because his level of activity had been more sedentary prior to the vacation, his prosthetic was not fitting properly and he believed this was contributing to the 20-point spike in pain. Due to the lack of research in this area, it is unknown what the normal fluctuations in pain are on a daily basis.

*Control 3 – 10.* These participants reported the pain ratings as the normal fluctuations in pain. There is a difference of 5-10-points from week 1 to week 4. The graphs can look like their pain changed a lot if you don't actually looked at the scale they are being measured on. There was no difference from week 1 to their last week for pain ratings on the DPRS.

*Treatment 1.* This participant was referred to the study multiple times through the Amputee Clinic. He had multiple health problems that were complicating his ability to focus on one task to completion. I originally met with him while he was an inpatient on the rehabilitation unit. He was being fitted for his prosthetic and learning to walk on it 8 months post-amputation. His amputation was the result of an ulcer that developed on the bottom of his foot due to neuropathy. His other leg was severely impaired with poor circulation. His pain was fairly constant with intermittent bursts of sharp, severe, pain. As the sessions went on, he never reported that the pain disappeared. Only that the pain was changing and becoming less irritating and more generalized, less pronounced in specific areas. He cancelled multiples time before we even met for the first time due to problems securing a ride and not feeling well. Figure 18 shows a gradual decline in the pain ratings over the course of 8 weeks.



We met for the initial session at week 1. The first session of hypnosis was at week 2. Several weeks were missed due to health concerns and we met again for the second hypnosis session at week 5. The last hypnosis session was at week 7. The interesting piece is that even though he missed several weeks in between the first and second session, there is still an obvious decline in his pain ratings. The decline is more than the control group during their last week and with only one session of hypnosis (14-points). This trend continues downward as the week's progress. At follow-up one month later, he was continuing to feel improved from his baseline.

During our last session, he gave me a card, which he has given me permission to quote. "Thank you for allowing me to be a subject in your study of the effects of hypnosis in decreasing phantom stump pain in amputees. While somewhat lessening my pain(s), the techniques you have taught me have allowed me to lessen associated maladies such as anxiety and depression. I hope to take these valuable skills with me to calm any anxiety or lessen depression associated with phantom stump pain..."

*Treatment 2.* This participant was referred by a friend to the study. He had severe pain on a daily basis that debilitated him in multiple ways. He would spend weeks in his house without going out, he was unable to use a prosthetic device, and he had difficulty wearing anything but sweatpants on his stump. He reported that the pain was unmanageable with medication, so overtime he just stopped going places as a result. He stump was very sensitive to anything touching or rubbing it so that he couldn't wear denim or any other type of material besides sweatpants.

Following the first hypnosis session (week 2), he came back week 3 and reported that he felt so good that he stopped all pain medication. He said he was fine for the first

two days, but then his pain increased to a point where it was intolerable again and he felt sick. There is a 20-point decline from week 1 to week 2 and a 20-point spike from week 2 to week 3. He was asked to consult with his physician before attempting to stop his narcotics, as they need to be tapered. It is likely that he experienced some withdrawal symptoms because of taking himself off all of his medications.

During the next weeks, his pain continued to decline and he was coming to his sessions wearing jeans. He stated that his stump was less sensitive to the rubbing of the material and he was able to go out to the bank by himself for the first time in months. He was very ecstatic at having a renewed sense of freedom that came with his decreased pain. At follow-up, he reported that his pain was gone most days of the week and that infrequently he would experience some mild pain in his phantom foot.

*Treatment 3.* This participant was referred through the Amputee Clinic. He had a difficult time talking about his problems and pain. During the hypnotizability induction, the conference room next to the office was being used. The lunchroom on the other side was also being used for a meeting. The noise was incredibly distracting for both of us and he scored only a 2 on the 5-point SHCS. I discussed his score with him and asked if he would like to proceed with the study. He agreed to proceed despite his lower score. During future sessions, it was found that he was fully able to immerse himself into the hypnotic experience and was probably actually a 4 or a 5 on the SHCS.

We met weekly and he had the flu during the 4<sup>th</sup> and 5<sup>th</sup> week and returned for his 3<sup>rd</sup> induction week 6. Figure 20 shows his pain increasing week 4 by 20-points and then decreasing back down to 3-points. This participant would report that there was no change in his pain from week to week. Yet, his DPRS clearly showed that he was

having some effect. It was only by week 7 when he was able to tell me that his pain had “somewhat diminished.” He had a lot of referred pain into his back from wearing his prosthetic and walking in an awkward fashion as a result. He even reported that the referred pain was slightly better. This is where pain becomes complicated because each participant has their own unique experience with their pain. Follow-up at 3-weeks showed his referred pain was still painful and present. His phantom pain was lessened, but present. Without actual numbers to match the pain it is difficult to know what this means.

*Treatment 4.* This participant was referred through the Amputee Clinic. He had intermittent phantom pain that required narcotics when it got severe. He wears a prosthetic device everyday and has constant stump pain. He was initially reluctant to try hypnosis, but felt like he did not have any options for treatments. He traveled over an hour by ambulance every week to come to the sessions and reported that he loved the hypnotic experience. There was a 25-point difference in reported pain from week 1 to week 5. No follow-up was done on this participant.

*Treatment 5.* This participant was referred to the study through the Amputee Support Group. He was the only upper limb amputee in the study. He lost his arm above the elbow following being hit by a motor vehicle while walking. He had severe, sharp, and unrelenting pain in both his stump and his phantom. He reported that his hand had telescoped to the end of his stump and that the hand was in an awkward position. The fingers were digging into the palm of his hand. He was unable through thought to move his hand or his fingers.

He was open to the use of hypnosis despite the reluctance of his family and friends. Following his first hypnosis session, his pain decreased 15-points. Again the second session and by the third session his pain was only a tingle. Due to the way this participant lost his limb, it was thought that there might be some strong emotions attached to the amputation. Hypnotic suggestions were used that diminished the pain to a tingle and referred the pain to the end of his pointer finger on the other hand. Following his second session, he reported a strange tingling sensation at the end of his pointer finger. I reminded him of the suggestion, which he had forgotten. By the third session, the tingling had left the pointer finger and the pain in his arm was all but gone. His hand had relaxed and was no longer digging into his palm. The follow-up at one-month showed that he is still virtually pain free with slight tingling.

*Treatment 6.* This participant had heard about the study through multiple avenues. He was very reluctant to volunteer because of his fear of hypnosis. When he realized that his pain was increasingly becoming worse and his physician did not have anything to help he signed up.

This participant lost his limb when a boulder fell from a rock wall and crushed his leg. Prior to the accident he was a hard worker and always doing something. When I first met with him, he stated that he was angry all of the time and that no one in his family wanted to be around him. He was concerned that the pain would prevent him from continuing to wear his prosthetic and ambulating independently.

He lived in the country and had to drive over an hour to get to his appointment. He cancelled two appointments due to not feeling well. The hypnosis sessions were week 2, week 4, and week 6. Overall, he had a 40-point decrease in his pain ratings.

By the end of this study, this participant was out mowing the lawn, working on his car, and taking walks with his family. He stated, “you gave me my life back” at the end of the last session. His family also reported that his anger had diminished and that they enjoyed being around him again. I also received calls from his physician stating what a difference they saw in his overall attitude and pain. The follow-up on this participant at one month and 6-weeks showed he continued to improve. He reported only mild pain and is much more active than was reported during the initial interview.

*Treatment 7.* This participant was referred from the Amputee Support Group. He had severe pain on a daily basis and lost his limb because of cancer 14-years prior. He had a complete hip disarticulation (complete removal of hip) and was unable to wear a prosthetic. He also had severe pain in his other limb due to a pressure fracture from overuse. During the course of this study, he was receiving physical therapy for his leg. His pain ratings declined 27-points following the first hypnosis session. His pain remained stable after that. He noted that his pain was at a tolerable level and that he was able to manage stress better and use self-hypnosis when the pain got worse. He had surgery within days of completing his last session. I discussed this patient with his physician approximately 3 weeks later and found that he continues to be improved from his baseline.

*Treatment 8.* This participant was referred through the Amputee Support Group. He had multiple health issues such as heart problems, high blood pressure, and diabetes. He lost his limb due to diabetes complications almost 3-years prior. His pain was preventing him from using a prosthetic and ambulating independently. His pain

dropped 20-points overall and he was able to start exercising more regularly. His spouse also reported that his mood had shifted and he was more positive.

*Treatment 9.* This participant was referred through the Amputee Clinic. He lost his leg due to an injury to the limb. He was always active and since his amputation four years ago, he has stopped participating in things he once enjoyed such as fishing. He hardly leaves the house because the pain makes things so unbearable that he does not enjoy going anywhere. Following his first session, he had a decrease of 20-points. He reported at the next session that he was able to leave the house to run errands. The second session showed a similar decline in pain ratings with his total decrease in pain intensity being 68-points at his last session. At the last session, he reported that he was now spending more time with his family and helping out in the yard. He felt more productive and his overall mood appeared improved. There was no follow-up on this participant.

*Treatment 10.* This participant was referred from a pain clinic in Charleston, WV. His limb was amputated due to cancer 5 years ago and he was severely debilitated by his daily stump and phantom pain. He cancelled the first several appointments due to coexisting medical issues, which he would not speak of initially. We met to do the initial questionnaires and then we terminated sessions before doing the first hypnotic induction due to bedsores on his buttocks. He was unable to sit or concentrate. We agreed that when he got well enough to sit that we would continue. I spoke with him several times over the next two months to check on his status. He finally admitted that he was afraid that his cancer had returned and he was throwing up on a daily basis. He had problems with his gastrointestinal tract and that he was undergoing multiples tests.

We discussed the benefits of hypnosis for pain management and cancer. He agreed to continue with the study despite his fears and problems.

We began the hypnosis sessions and following the second session there was a dramatic decrease in his pain of 35-points. During the third session, he reported that he was doing better and his nausea during the day was diminished. His pain was decreased to nearly zero by our last session. Directly following the last session, he found out that he had an intestinal blockage and had surgery to remove it. He did not have cancer. At follow-up 5 weeks later, he was still doing well with his phantom and stump pain virtually gone.

### *Theoretical Explanations of Findings*

Following three sessions of individualized, tailored inductions, participants in the treatment group were able to greatly decrease their pain intensity as measured by the total Pain Rating Intensity subscale, the Number of Chosen Words, the Present Pain Intensity subscale, Pre-Posthypnotic Rating Scale, and the Pre-Post Daily Pain Rating Scale. The hypnotic treatment group was found to be similar to the control group at the beginning of the study; yet, the control group did not have a significant decrease in their pain intensity. The figures 8-27, in Chapter 4, clearly show each participants improvement or lack of improvement as the study progressed. There are many theories on pain to offer an explanation for these results, but the Gate Control Theory (Melzack & Wall, 1965) is the most widely accepted theory and as such will be used here.

The GCT proposes that the spinal cord has a gating system that allows messages sent from peripheral nerve fibers to travel up to the brain. These signals are

then carried by both large and small fibers called A-delta and C-fibers. It is believed that the gates can be closed or tempered through sensory input such as relaxation techniques, meditation, and hypnosis. It is possible that the signals normally sent from the stump or phantom limb are able to interfere with the gating system and ultimately change the pain signals within the areas of the brain (thalamus, somatosensory cortex). The gate then closes more and more as the sessions continue.

A theory that is more specific to phantom limb is the Somatosensory Pain Memory Model. This theory views phantom limb pain as being derived from imprinted memories of the pain prior to amputation or an intense experience of pain that lasted long enough to be imprinted. Experiencing pain prior to amputation was reported by approximately 70% (n = 14) of the participants in this study. It is possible that the other 30% (n = 6) had pain intense enough following their amputation that it created a pain memory.

This theory is based on findings that many amputees report pain similar in both location and quality to that experienced before amputation. It suggests the pain is related to a combination of central and peripheral system dysfunctions, as the Gate Control Theory is the basis. It is believed that long lasting noxious (harmful) input, such as pain, may lead to long-term changes at the cortical level. This means that the brain changes because of long-term, perceived pain. The somatosensory cortex is known to be involved in processing pain, and may be important in sensory-discriminative features of the pain experience (Flor, 2002). Sensory aspects of pain include descriptors such as those found on the McGill Pain Questionnaire like throbbing, pounding, shooting,



stabbing, cutting, pinching, burning, tingling, dull, heavy, and splitting (Turk & Melzack, 2001).

This theory posits that the nerves are activated from the pre-amputation pain, which then transmit signals through the gates and on to areas of the brain. Once the limb is amputated, the nerves remain activated and free to continue sending signals. Hypnosis may interfere with those signals being transmitted or may assist in closing the gates. Perhaps the hypnotic experiences were powerful enough that participants were able to be fully present with the hypnotic experience and were able to rewrite the pain memory or create a stronger signal that perhaps overlays the other signals. This would require more than a moderate ability to be hypnotized.

The participants in this study were highly hypnotizable with 15 (75%) participants having scores of 4-5. Of those, 9 were in the treatment group. The other treatment participant scored a 2 on the Stanford Hypnotic Clinical Scale. It was later determined that he was actually highly hypnotizable. This is consistent with recent findings on tailored versus scripted inductions where participants are able to be more involved in the hypnotic situation (Barabasz & Watkins, 2005). Participants in this study were at the top of the scale for the SHCS and would most likely be considered in the high range on the 12-point Stanford Hypnotic Susceptibility Scale: Form C.

This is an interesting finding, considering hypnotizability is supposed to be on a leptokurtic curve with the majority of the population falling in the middle and 5-10% on each end. It is possible that the investigator's hypnotic skills were such that the participants were easily able to reach their true potential for hypnotic depth. Other reasons include evidence that physiological response to suggestion is influenced by

certain forms of sensory restriction or isolation (Barabasz, 1982; Barabasz & Gregson, 1979). It is known that amputees can spend months at a time in the hospital. Often the rooms are small and due to their new limitations amputees are often reluctant to move about making their world that much smaller. They may be experiencing something similar to sensory restriction in the hospital and/or at home while recovering. The increased pain makes it more difficult to focus on anything else, but what they are experiencing.

While there is still controversy in the field, other correlates of hypnotizability include fantasy proneness (Lynn & Rhue, 1988), absorption (Tellegen & Atkinson, 1974), imaginative involvement (Hilgard, 1974), cognitive flexibility (Crawford, 1989), and dissociation (Barabasz & Watkins, 2005). While these correlates were not tested in this study to confirm or deny their presence in the participants, it seems likely that many of them would have these one or more traits. Dissociation seems likely with several of the amputees that had traumatic accidents or illnesses that resulted in the loss of their limb as they work to separate themselves from the strong, painful feelings and thoughts. Further, the pain that they experience on a daily basis may be a reminder of the tragedy.

#### Neo-Dissociation Theory

According to this theory, the amputees in this study were able to successfully block the pain from their present experience behind the amnesic barrier. They dissociated from their stump and/or phantom limb pain. If asked about their pain following the suggested removal of it during the actual hypnotic procedure, it is likely

that participants would have had the aspect of themselves known as the “hidden observer” respond affirmatively to an awareness of pain. The high hypnotizability of the participants make this scenario more likely considering the treatment groups time in pain ranged from 8-months to 51-years. It is most unlikely that any of the participants in the treatment group faked, role-played, or acquiesced their results considering the significant length of time the participants have spent in pain. The amputees in this study and most amputees in general are used to medical situations and especially used to not having their pain relieved. In fact, most came to the study expecting another treatment failure. Additionally, many of the referring physicians also expected a treatment failure.

It is probable that the participants in this study spend time each day in a naturally occurring dissociated state. Many have limited access to transportation and mobility is difficult. This makes them more likely to spend time alone, in intense thought, day dreaming, and/or contemplating, which are considered states of focused attention. Barabasz and Watkins (2005) reported the dissociative process as an aspect of self-hypnosis that may be a protective feature of the pain control system. Thus, the more pain that is experience either physically or emotionally by individuals, the more common the tendency to dissociate from the present state of awareness.

### *Cortical Remapping Theory*

One issue that I really was not prepared was the pain that amputees experience while going to the bathroom or while having intercourse. This issue came was brought to my attention very early in the study and was reported infrequently in the literature.

Early on, a participant asked me if I thought they were crazy because they were having phantom limb pain while having a bowel movement.

I then informally added this question to the Amputee Questionnaire.

Interestingly, 9 (45%) participants admitted that they experience phantom pain while having sex, a bowel movement, or both. Six participants were in the treatment group. One person admitted that he had never told his spouse that he has severe pain while having intercourse and that he has felt “crazy” for years. He was afraid that his wife would leave him. It is also possible that some of the other participants were embarrassed to discuss this issue with me and therefore would not admit to it.

This again reiterates the importance that physicians explain the theories of phantom limb pain. I discussed the Cortical Reorganization theory with amputees, as I believe this theory explains this phenomenon the best. The sense of relief that the participants felt when I talked about this theory and some of the others previously mentioned was amazing.

Oakley and Halligan (2002) reported that remapping of the brain could occur as quickly as 24 hours and this remapping can include other areas of the brain moving into the now inactive space where the amputated limb resided. Ramachandran and Blakeslee (1998) spent time researching how sensory information coming from the face or other areas of the brain could invade other areas of the brain once designated to the amputated limb. It is known that on the homunculus, the area of the genitals is next to the legs and the area of the arm is next to the lips and face. It makes sense that the neural signals that are being sent from the area of the genitals, which have now invaded

the area of the leg, are also sending neural signals to cells once designated to the leg. The brain is still intact. It is the leg that has been removed.

### *Implications of Findings*

The main purposes for this research project was exploring the area of hypnosis as a treatment for residual stump and phantom limb pain. It was the primary investigator's goal to add to the limited literature available on utilizing hypnosis for residual stump and phantom limb pain. Alleviating some of the chronic suffering that amputees are forced to endure on a daily basis. Lastly, this study was intended to offer information to physicians, clinics, and rehabilitation units on the multiple benefits of using hypnosis for chronic stump and phantom limb pain.

Hypnosis has been overlooked extensively in the research on stump and phantom limb pain. As noted earlier, there are only a handful of studies available and they are mainly case studies. Yet, hypnosis has a long history of being used for a multitude of pain problems, but somehow hypnosis was not seriously researched with amputees. Perhaps this is due to so few clinicians having adequate hypnosis skills or the lack of access to amputees. Regardless, hypnosis has been shown to be effective for chronic pain by the NIH (1996) and the results showed the effectiveness of hypnosis for chronic pain. It appears that the robust results of this study seem to validate the use of hypnosis for chronic pain and offer a more controlled study to the research literature.

Most importantly, amputees appeared to benefit from the individualized, tailored hypnosis sessions. The amputees were initially reluctant to volunteer for the study due to the myths that surround hypnosis. Quite often, amputees would hear the word

hypnosis and would ask if they would be made to act like chickens. They would also ask if they would remember anything when the session was over or if they would admit to things they had done wrong in the past. Participants (n = 8) that heard about the study through the Amputee Clinic would often have to hear about the study 3-4 times before they would finally sign up out of fear and lack of knowledge of hypnosis.

Yet, once the participants had their questions addressed thoroughly and all of the hypnosis myths debunked, they would often reluctantly undergo their first hypnotic experience. This was the turning point as the participants often responded with “that was not anything like I thought it would be, that was cool, I enjoyed that, it felt like no time passed, and that was so different from what I was told by my friends.” Participants frequently showed up to their sessions and reported how much they enjoyed the sessions, how much they had gotten from the last session, and how their pain was changing. Several participants (n = 8) asked if they could continue the sessions after their required number of research sessions. Sadly, there was not anyone in the area that I could refer the interested participants. The closest place was in Virginia, which was three hours away.

Sixteen participants had to have assistance in order to get to their appointment. Participants even traveled up to 90 miles to the hospital by ambulance and made all of their appointments. When there was so much adversity in order to make it to their appointment, it is unlikely that \$20 per session was the motivating factor.

It is more likely that the motivating factor was the pain they initially felt and later the change that amputees saw occurring in their lives as a result of less pain. During one session, a participant exclaimed that he was able to go to the store by himself for

the first time in a year during the past week. That is a huge accomplishment. Another stated that he was taking himself off of all of his narcotics because he felt so good. Yet another, stated that he was going to meet with his prosthetist to see about getting fit for a new prosthetic. Multiple studies have confirmed that people's ability to function is greatly diminished when their pain goes above a 5 on a 10 point scale (Huse, Larbig, Flor, & Birbaumer, 2001; Jensen, Smith, Ehde, & Robinsin, 2001; Sherman et al., 1987; Whyte & Niven, 2001). Their self value is lowered, they do not feel they are contributing members of society, and they often feel isolated as their world becomes smaller. This additionally contributes to higher rates of depression and isolation (Jensen et al., 2001).

This sample reported a high incidence of depression (65%, n = 13) with only 3 participants receiving formal treatment from someone other than their primary care physician. Nine of the 13 were on antidepressants. This high rate of depression may be due to the high rates of reported pain in this sample, living in a rural community with no access to care, sense of isolation, and/or limited mobility. The stigma attached to mental health diagnoses may prevent participants from seeking help or their lack of understanding regarding the diagnoses. They may believe that the depression will eventually go away or that they do not need help. They may also believe that they are crazy and that something is wrong with them as a result of having phantom limb pain. Stump pain is easier for a person to cognitively understand, but phantom pain is more difficult. They cannot see or touch the part of them that is hurting. They do not have a logical explanation, nor does the research community.

Depression may go untreated because many of the issues faced by amputees are still largely misunderstood by the research community let alone their treating

physicians. Physicians may not be asking the appropriate questions or normalizing the process, so amputees feel free to discuss the issues. Similarly, with depression is the problem of pain.

Uncontrolled pain is a major problem in this country; yet, only one participant had their physician attempt an explanation of what might be wrong with them. Only a few participants (n = 3) felt like they could say what they wanted to their treating physician. The more likely story was they felt as though they had to mask or hide their symptoms, so not to be thought of as crazy. Some participants actually cried during sessions when they described what they have been experiencing and how it made them feel, crazy. Sherman et al. (1984) reported similar stories of amputees feeling as though they could not discuss their phantom limb pain with their physicians. It was also reported that doctors are not adequately treating the pain or are prescribing treatments that have been validated as inadequate.

This problem may be due to inadequacies found in the literature and the multitudes of inconsistencies. It was once reported that phantom limb pain was virtually non-existent with only 5% of amputees experiencing it. It has now been firmly established that the incidence is more close to 70% or more. Further, no studies have been done solely to research stump pain. Stump pain is commonly paired with phantom pain, as the incidence is approximately 80%. It may also be a problem of inadequate information being disseminated to the treating physicians. They may not understand phantom limb pain and will therefore avoid asking questions regarding the pain. They may be more avoidant or seem standoffish to the patient as a result. The treating physicians may feel helpless knowing that long-term effective treatments are



not available and medication is often the only option that is tried. Further, in West Virginia very few physicians specialize in treating amputees. This leaves the amputee in a position to travel long distances for care or work with an inadequately trained physician for their specific issues. Neither are good options.

The point is that more information on amputee issues needs to be disseminated to physicians as the problems with obesity and diabetes increases, so to will the rates of related amputations. Hypnosis as a treatment option works well. It allows physicians to feel confident that what they are recommending is something that has been working for years with chronic pain patients. Hypnosis will expectantly be validated as an effective treatment for phantom limb pain as more research is completed. Hypnosis can be used in conjunction with all other treatments. Patients do not have to stop taking medication or change their regimen in any way. They are able to feel more in control as they learn the techniques of self-hypnosis.

One physician in the Amputee Clinic was initially reluctant to recommend the research due to reasons similar to the patients, myths. Jokes were commonly made in front of patients because the physician was uncomfortable bringing up the subject of hypnosis. "Don't worry she won't make you cluck like a chicken." This conveys the same fears to the patient. The physicians need to be behind the treatments that they are recommending. Interestingly, as the study progressed, patients began to return to the clinic with positive results, the jokes stopped, and the way new patients were introduced to the study became more serious and full of intention. Patients were then told that the study was working and they will probably have positive results as well. Further, this same physician began giving referrals for hypnosis to other patients with a

variety of medical complaints. This physician by the end of the study was campaigning to have me stay on or to have someone trained that could continue the hypnosis.

The physicians need to feel confident in the treatment they are recommending as the patients look to them for the answers. If they do not have the answers then they need to be able to convey that to the patients in an honest manner and educate themselves for the patient's next visit. Amputees should be able to, at the very least, have an explanation of the phantom limb pain that normalizes the process, so they are not left feeling alone, mentally unstable, and crazy.

### *Limitations of Research*

The limitations of this study include that the participants are from only one geographical area of the United States. The majority of the participants were white males that lived in a rural community. The sample size was small. These may limit the ability to generalize the results to other groups of individuals with residual stump and phantom limb pain. Further, the study limited participants by the inclusion and exclusion criteria. The researcher limited the scope of this study in four specific ways. First, population restricted the study as participants had to be 18 years and older, suffering from chronic residual stump and/or phantom limb pain for a minimum of six months. Location was limited to the state of West Virginia and participants that were able to regularly commit to the scheduled appointments. Third, participants were not accepted if they were diagnosed with self-reported drug or alcohol problems. They were also excluded based on psychological history. If they had a history of psychosis or schizophrenia, they were not included in the participant pool. Then participants had to

have pain that was intense and influencing their life, so it was measurable. Thus, the likelihood that the results of this study would generalize to amputees outside of the above-mentioned criteria is questionable. All of these conditions limit the external validity of the study. Yet, the reason for participant amputations (diabetes, motor vehicle accidents, injury) and the variety of places that participants were recruited from may make this sample more representative of the larger population at least within the state of West Virginia.

Another limitation is that all data were obtained from self-reported measures. Participants were asked to go home and write down their pain everyday for one month. It is possible that they wrote all of their numbers directly before their appointment making the data less reliable. Yet, the results of the study do not suggest that participants were acquiescing.

This study was additionally limited by the self-selection of participants to the advertisements and solicitations from physicians for volunteers to participate in an experimental stump and phantom limb pain treatment. Therefore, the results of this study are limited to the type of population that would respond to such ads. It is likely that the attitudes of participants volunteering for an experimental study may differ from participants choosing not to participate in a study of this nature. Further, those volunteering may also differ in magnitude of pain from those individuals just seeking treatment from a physician for pain. These factors are the basis for using caution when attempting to interpret, generalize, or replicate the results of this study.

This research had only one investigator that was meeting with all of the amputees and doing the recruiting. All sessions were done with the investigator. It is

unlikely, but possible that the results are due to the researcher. Other studies should have multiple therapists that are working with participants and doing the hypnosis sessions as well.

Lastly, the follow-up data was informal and did not include all participants. A formal follow-up that followed the format of the study would improve the findings tremendously and add strength to the numbers since it is known that stump and phantom limb pain fluctuate over time.

### *Strengths of This Research*

The random assignment and comparable control group add to the results of this study. The participants were initially motivated by their pain to attend the sessions, but it appeared that later they were motivated by the changes they saw happening in their lives. The most valuable piece is the regaining of something they thought was lost and in only a few weeks time. The short duration of the study and the limited sessions, add value to the information presented. It shows that something significant is happening and with some of the participants, the change can be seen within the first week. The individualized, tailored, hypnosis sessions assist to ensure the involvement of the participant and make it personally meaningful to them. Most importantly, the ease of hypnosis, the lack of tools involved, and the short duration required make this an invaluable tool for a hospital or clinic. It is perfect for individuals or groups. Can be changed to match the situation with little effort and can save money for the institution. The cost saving benefits come from a variety of sources, but starting with chronic pain patients repeat visits to medical providers. The duration of stay in the hospital is

generally longer due to concomitant issues chronic pain patients have including depression. Medications are a huge cost as well as time lost. Hypnosis is an important tool for chronic pain in general and this study shows that it is also valuable in the treatment of residual stump and phantom limb pain.

#### *Future Research Directions.*

This study found the DPRS to be invaluable. So little seems to be known about how amputee pain fluctuates over time that a longitudinal study looking at long-term fluctuations in pain would be helpful. This scale also gave participants a way to monitor what was going on during the day or week. Overtime they were able to see the fluctuations. In addition, grouping phantom limb pain and stump pain together on the pain charts was difficult to sort out. New studies should log stump pain separate from phantom limb pain.

I would also recommend that future studies examine hypnotizability within the amputee population. It was surprising to see the majority of participants within this sample score in the high range of the SHCS scale. It may have been more useful to use the Stanford Hypnotic Susceptibility Scale: Form C to clearly differentiate between those that are high and those that are moderate in hypnotizability. The Form C offers a 12-point scale.

Another unexpected finding was the phantom limb pain that was brought on by stimulation of the bowels or genitals. This was not highlighted in the literature and was difficult to find when I was seeking it out. It is unclear what percentages of amputees actually do experience this.

### *Conclusion*

This study evaluated the treatment effects of hypnosis on individuals with residual stump pain, phantom limb pain, or both. The results showed that individualized, tailored, hypnosis sessions are effective in dramatically diminishing the pain experienced by amputees in as few as three sessions with a resultant increase in quality of life.

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## APPENDICES

## APPENDIX A:

**Recruitment Letter**

Dear Care Provider,

My name is Julie Rickard and I am currently a psychology intern in the WVU School of Medicine, Department of Behavioral Medicine & Psychiatry program. As part of my requirement to complete my doctorate degree with Washington State University – Pullman, WA, I am conducting a dissertation research project titled: Effects of Hypnosis in the Treatment of Residual Stump Pain and Phantom Limb Pain. My faculty sponsor at WVU is John Linton, Ph.D., ABPP (341-1500) if you should have any concerns or questions regarding this study.

As you can see from the title, this research involves the use of participants who are experiencing chronic stump or phantom limb pain as a result of complications related to amputation. As someone who works closely with this population, I am asking for referrals of patients that you believe could benefit from the study. This will require minimal effort on your part. All you have to do is give patients you believe could benefit from the study the flyer that has the study contact information. Due to the HIPPA regulations, interested patients must make the initial contact. I am not able to initiate contact, so please have them call the number listed on the flyer. I will be happy to explain the study in detail to any interested patients and screen them for inclusion/exclusion criteria. I have listed the criteria below, so you can see what I will be looking for.

The study is expected to begin sometime in April. In total, participation will last 8 weeks and require approximately 6-8 hours of time. Participants will be required to record their pain on a daily basis as well as fill out other pain related measures. They will also utilize hypnosis weekly as a way of potentially reducing their current level of pain intensity. Hypnosis is known to be a natural way for patients to reduce their chronic pain while being able to maintain other treatment regimens.

In order for participants to be considered for this study they must be 6 months post-amputation, experience significant pain that can be measured on self-report scales, and be over the age of 18. Other exclusion criteria that I will be assessing for during the initial telephone screening will include a history of psychosis, emotional disturbances, drug or alcohol problems, and unmotivated to change their pain. Things that I will be looking for in participants include a high motivation to change their pain intensity, willingness to undergo hypnosis weekly, and willingness to remain drug/alcohol free during the course of the study.

Thank you for your assistance with this. Please feel free to contact me if I can answer any additional questions at 341-1506.

Sincerely,

Julie A. Rickard  
Psychology Intern



APPENDIX B:

# **AMPUTEES...**

## **EXPERIENCING STUMP/PHANTOM LIMB PAIN?**

**New** research study designed to  
reduce/alleviate  
chronic stump & phantom limb pain with  
hypnosis

Participants must be willing to participate once a week for up to 8 weeks, monitor pain regularly, undergo weekly hypnosis sessions, and complete pain questionnaires. Other study criteria may apply. Call to see if you qualify.

**Meetings will be held at CAMC General**  
**Time commitment: 45 minutes to 1 hour weekly**

For more information and starting dates, contact:

**Julie Rickard**  
**WVU School of Medicine**  
**Department of Behavioral Medicine & Psychiatry**  
**501 Morris St.**  
**Charleston, WV 25326**  
**341-1506**

APPENDIX C:

# **AMPUTEES...**

## **EXPERIENCING STUMP/PHANTOM LIMB PAIN?**

**New** research study designed to reduce /  
alleviate chronic stump & phantom limb pain  
with hypnosis

Participants must be willing to participate once a week for up to 8 weeks, monitor pain regularly, undergo weekly hypnosis sessions, and complete pain questionnaires. Other study criteria may apply. Call to see if you qualify.

**\$20 compensation for travel will be given  
to offset expenses for each session.**

**Meetings will be held at CAMC General  
Time commitment: 45 minutes to 1 hour weekly**

For more information and starting dates, contact:

**Julie Rickard  
WVU School of Medicine  
Department of Behavioral Medicine & Psychiatry  
501 Morris St.  
Charleston, WV 25326  
341-1506**

## APPENDIX D:

**Effects of Hypnosis in the Treatment of Residual Stump Pain and Phantom Limb Pain****INFORMED CONSENT FORM****Julie Rickard, Psychology Intern (341-1506)****INTRODUCTION**

You are being asked to participate in this research study which examines the effect hypnosis has on chronic stump and phantom limb pain. This research is part of the requirements for completion of a doctoral degree through Washington State University in Pullman, WA. The Institutional Review Boards of Washington State University and CAMC/West Virginia University has approved the participation of subjects in this research project. If you should have any questions or problems, contact information is listed below. This research has no external funding source and is being funded solely by Julie Rickard.

**PURPOSE**

Rationale for the Study: Research shows that many people have chronic stump and phantom limb pain following amputation. It is currently unclear what causes this pain and how to best treat it. To date, there are multiple treatments available to treat stump and phantom limb pain, but most of the treatments have limited effect on the pain or the pain relief subsides over time. Therefore, it is important to explore treatment options such as hypnosis. Hypnosis is known to be helpful for multiple other chronic pain problems and is thought to be helpful for stump and phantom limb pain. However, it is still considered a new treatment because little is known about how it works with stump and phantom limb pain. Thus, the aim of this study is to determine if hypnosis is especially helpful in the alleviation of stump and/or phantom limb pain.

**PROCEDURES**

A Brief Overview: Volunteers who commit to the study will spend about 6-8 hours over a two-month period monitoring, documenting, and meeting individually with me. Approximately 24 participants are expected to take part in the study and the majority will be from Charleston, WV and surrounding communities.

Your involvement will require you to do the following:

- Meeting on a weekly basis.
- Monitor and log your pain daily for 4-8 weeks using the Daily Pain Rating Scale. (5 minutes)
- Monitor pain before and after the hypnotic induction. (5 minutes each)
- Complete the Amputee Questionnaire. (30 minutes)
- Complete the McGill Pain Questionnaire before and after treatment. (20 minutes)
- Undergo hypnosis on a weekly basis to control pain. (1 hour)
- Remain free from recreational drugs during the course of your participation.

You have the right not to answer any question on the questionnaires that makes you uncomfortable. You may also ask to see a copy of the questionnaires prior to signing this consent form.

## **BENEFITS**

### What are the benefits for you?

By participating in this study, it is intended to have your pain intensity decreased or eliminated completely through natural methods. The gains may be short-term or long-term. You will still be able to maintain your other treatments while participating in this research. Most often people enjoy hypnosis and find the experiences pleasurable and interesting. Outside of these immediate benefits, you are assisting in furthering the knowledge available on stump and phantom limb pain to researchers, clinicians, and the medical field by choosing to participate.

## **FINANCIAL CONSIDERATIONS**

Your participation is completely voluntary. You will not be reimbursed for your time or travel expenses. There will be no financial compensation. This research is funded completely by Julie Rickard.

## **RISKS**

### What risks are there for participating in this study?

The risks for your participation are minimal. There is a very slight chance that you may feel some discomfort, uneasiness, and/or unexpected emotions. You will be in control during each of the sessions while in hypnosis and you are free to stop participating at any time. There is a chance that you will not experience partial or complete relief of pain by participating.

The treatments and procedures involved in this research study may have risks not yet known. In the event new information becomes available that may affect your willingness to participate in this research study, this information will be given to you so that you can make an informed decision about whether or not to continue your participation. If you should have any problems related to your participation during the course of this study you are welcome to contact Julie Rickard (304-341-1506) or the research faculty sponsor John Linton, Ph.D. (304-341-1500).

In the unlikely event that you have the possible side effects listed above or others not listed during hypnosis you will be offered one free counseling session by Julie Rickard. You will also be given a referral list of counselors in the area and may choose to see one of those listed at your own expense for follow up. You will not be given monetary compensation or payment for the costs associated with research-caused side effects. You may choose to continue with the research or withdraw at anytime.

## **ALTERNATIVES**

There are multiple treatments that are available for stump and phantom limb pain with different levels of effectiveness. Medication is the most used treatment, followed by physical therapy, nerve blocks, steroid injections, transcutaneous electrical nerve stimulation, surgery, spinal cord stimulator, relaxation, biofeedback, and massage. These are only a few of the available treatments. You also have the option of not receiving any treatment at all as determined by your physician. You are welcome to discuss these treatment options with your physician before signing this agreement.

## **Effects of Hypnosis in the Treatment of Residual Stump Pain and Phantom Limb Pain**

### **VOLUNTARY PARTICIPATION**

You are agreeing to participate in this study ran by Julie Rickard. This study investigates residual stump and phantom limb pain. Your participation is entirely voluntary. You can leave the experiment at any time and this will not have any other undesirable consequences. Leaving the study will not impact the medical care that you receive now or in the future.

### **CONFIDENTIALITY**

All of your responses will be held confidential. No one except the Principal Investigator and the research staff directly connected with the project will have access to the information provided. This may include the Institutional Review Board, faculty supervisors, statisticians, and research assistants. No information, which identifies you, will be released without your separate consent. In all probability, there will be publications about the results of the study, but they will not contain personally identifying material. All material regarding the research will be maintained for 7 years and destroyed following the end of the research project and final defense of the dissertation.

### **CONTACT PERSONS**

Julie Rickard is the lead researcher for this project and will be your main contact person if you should have any questions, concerns, or problems. The chair of the dissertation committee and faculty supervisor at Washington State University is Arreed Barabasz, Ph.D., ABPP, at (509) 335-8166. The local onsite faculty supervisor and sponsor through West Virginia University School of Medicine is John Linton, Ph.D., ABPP, at (304) 341-1500.

For more information concerning this research and research-related risks or injuries, you can contact Julie Rickard at (304) 341-1506. You can also reach Julie by e-mail at [j\\_rickard@verizon.edu](mailto:j_rickard@verizon.edu). Additionally, you may contact my faculty supervisors with questions or concerns. If you have questions regarding your rights as a research subject, you may contact the CAMC/WVU Institutional Review Board at (304) 388-9971.

### **RESEARCH CONSENT**

**I have read and understand the conditions under which I will participate in this study, I have had all of my questions answered, I understand that I may stop participating at anytime, and I will be given a copy of this signed consent form. I give my consent to be a participant.**

\_\_\_\_\_  
Signature of Participant or Participant's Legal Authorized Representative

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Person Obtaining or Verifying Consent

\_\_\_\_\_  
Date

**CAMC/WVU INSTITUTIONAL REVIEW BOARD**  
**AUTHORIZATION**  
**TO USE AND DISCLOSE PROTECTED HEALTH INFORMATION FOR RESEARCH**  
**PURPOSES**

The privacy law, Health Insurance Portability and Accountability Act (HIPAA), protects my individually identifiable health information. Protected health information or PHI is defined as individually identifiable health information transmitted or maintained in any form (electronic means, on paper, or through oral communication) that relates to the past, present or future physical or mental health, or conditions of an individual. The privacy law requires me to sign an **Authorization** (or agreement) in order for researchers to be able to use and/or disclose my protected health information for research purposes in the study entitled **Effects of hypnosis in the treatment of residual stump pain and phantom limb pain.**

I authorize **Julie A. Rickard** and her research staff to use and disclose my protected health information for the purposes described below. I also permit my doctors and other health care providers to disclose my protected health information for the purposes described below.

**My protected health information that may be used and disclosed includes:**

- *Name, telephone number, age, years of education, time since amputation, work status*
- *Medical history as related to chronic pain in your residual stump and/or phantom limb.*

**My protected health information will be used to:**

- *Examine the effect hypnosis has on chronic stump and phantom limb pain over the course of 4-8 weeks.*
- *Assist Julie Rickard in conducting and completing her dissertation research project.*
- *Ensure that the research meets legal & institutional requirements. I am assured this research will not move forward without the approval of all institutions involved (Washington State University, West Virginia University, CAMC).*

**The Researchers may use and share my protected health information with:**

- *The CAMC/WVU Institutional Review Board and/or the Office of Research and Grants Administration*
- *Federal regulatory authorities such as the FDA, USDA, OHRP, DHHS, etc.*
- *CAMC, CAMC Health Education and Research Institute or West Virginia University-Charleston Division employees directly involved with the study*
- *Washington State University Institutional Review Board and Faculty Members directly involved*
- *West Virginia University research faculty sponsor and research assistants*
- *Statistician involved in calculating research data*

The researchers agree to protect my health information by using and disclosing it only as permitted by me in this Authorization and as directed by state and federal law.

I understand that once my protected health information has been disclosed to a third party, federal privacy laws may not protect it from further disclosure.

I understand that this Authorization does not prevent me from voluntarily disclosing my protected health information. I understand that I, too, am responsible for protecting my health information.

**I do not have to sign this Authorization. If I decide not to sign the Authorization:**

- It will not affect my treatment, payment or enrollment in any health plan or affect my eligibility to receive benefits.
- I will not be allowed to participate in the research study.

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**My Right To Access PHI and my study data:**

I understand that I have a right to access my own protected health information held by the researchers.

I understand that my protected health information data collected for this study will be destroyed 7 years following the completion and final defense of Julie Rickard's dissertation.

If I have questions or concerns about my privacy rights, I should contact the Privacy Office at (304) 388-1187. I may also request a copy of the Notice of Privacy Practices.

I am the research subject or am duly authorized to act on behalf of the research subject. I have read this information and I will receive a copy of this form after it is signed.

\_\_\_\_\_  
Signature of Research Participant or Legal Representative+

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name of Above  
Participant

\_\_\_\_\_  
Representative's Relationship to

+ Please include a description of Legal Representative's Authority to act on behalf of the research participant (e.g. Power of Attorney, Medical Power of Attorney, Legal Guardian)

APPENDIX E:  
**Effects of Hypnosis in the Treatment of Residual Stump Pain and  
Phantom Limb Pain**

**INFORMED CONSENT FORM**  
**Julie Rickard, Psychology Intern (341-1506)**

**INTRODUCTION**

You are being asked to participate in this research study which examines the effect hypnosis has on chronic stump and phantom limb pain. This research is part of the requirements for completion of a doctoral degree through Washington State University in Pullman, WA. The Institutional Review Boards of Washington State University and CAMC/West Virginia University has approved the participation of subjects in this research project. If you should have any questions or problems, contact information is listed below.

**PURPOSE**

Rationale for the Study: Research shows that many people have chronic stump and phantom limb pain following amputation. It is currently unclear what causes this pain and how to best treat it. To date, there are multiple treatments available to treat stump and phantom limb pain, but most of the treatments have limited effect on the pain or the pain relief subsides over time. Therefore, it is important to explore treatment options such as hypnosis. Hypnosis is known to be helpful for multiple other chronic pain problems and is thought to be helpful for stump and phantom limb pain. However, it is still considered a new treatment because little is known about how it works with stump and phantom limb pain. Thus, the aim of this study is to determine if hypnosis is especially helpful in the alleviation of stump and/or phantom limb pain.

**PROCEDURES**

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**BENEFITS**What are the benefits for you?

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## **Effects of Hypnosis in the Treatment of Residual Stump Pain and Phantom Limb Pain**

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Signature of Participant or Participant's Legal Authorized Representative

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Date

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Signature of Person Obtaining or Verifying Consent

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Date

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**TO USE AND DISCLOSE PROTECTED HEALTH INFORMATION FOR RESEARCH**  
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- I will not be allowed to participate in the research study.

**After signing the Authorization, I can change my mind and:**

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- If I revoke the Authorization, I will send a written letter to **Julie Rickard** to inform her of my decision.
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**My Right To Access PHI and my study data:**

I understand that I have a right to access my own protected health information held by the researchers.

I understand that my protected health information data collected for this study will be destroyed 7 years following the completion and final defense of Julie Rickard's dissertation.

If I have questions or concerns about my privacy rights, I should contact the Privacy Office at (304) 388-1187. I may also request a copy of the Notice of Privacy Practices.

I am the research subject or am duly authorized to act on behalf of the research subject. I have read this information and I will receive a copy of this form after it is signed.

\_\_\_\_\_  
Signature of Research Participant or Legal Representative+

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name of Above  
Participant

\_\_\_\_\_  
Representative's Relationship to

+ Please include a description of Legal Representative's Authority to act on behalf of the research participant (e.g. Power of Attorney, Medical Power of Attorney, Legal Guardian)

## APPENDIX F:

**Telephone Screening Questionnaire**

1. How did you hear about the study?
2. Reason for amputation?
3. Length of time since amputation?
4. Limb amputated?
5. Type of pain or issues you have currently (Briefly describe)?  
Phantom limb pain                      Stump pain
6. How much time is spent dealing with the pain?
7. How has your life changed as a result of the pain?
8. Did you have uncontrolled pain prior to your limb being amputated?
9. If chosen to participate, are you willing to abstain from using recreational drugs during the 4-8 weeks that you are participating?
10. Have you ever been diagnosed with bipolar disorder, schizophrenia, PTSD, or other psychological issue?
11. Have you ever been treated for psychological issues?
12. If chosen to participate, would you be willing to undergo hypnosis?
13. What makes you want to participate in this study?
14. Are you willing to drive to CAMC every week for 4 weeks in order to participate in this study?

## APPENDIX G:

**AMPUTEE QUESTIONNAIRE**  
**Standardized Questionnaire**

**PAIN RATING:**

When asked about how much pain you feel (how much you hurt), please rate the amount of pain on a scale which starts at 0 (no pain) and continues up to 10 (the worst pain you have ever felt). The higher the number, the greater the pain.

1. Name \_\_\_\_\_ 2. Phone # \_\_\_\_\_
3. Age \_\_\_\_\_ 4. Male \_\_\_\_\_ Female \_\_\_\_\_
5. Years of education: \_\_\_\_\_
6. Are you currently working? YES \_\_\_ NO \_\_\_ How long? \_\_\_\_\_
- If NO (Check all that apply): \_\_\_\_\_ Workers Comp \_\_\_\_\_ Disability \_\_\_\_\_ Social Security  
 \_\_\_\_\_ Retired \_\_\_\_\_ Unemployed-looking for work  
 \_\_\_\_\_ Unemployed due to pain \_\_\_\_\_ Unemployed by choice
7. Amount of time since your amputation: \_\_\_\_\_ months/years(circle)
8. Do you take medications for any of the following psychological issues (check all that apply):  
 \_\_\_\_\_ Depression \_\_\_\_\_ Bipolar \_\_\_\_\_ Other  
 \_\_\_\_\_ Anxiety \_\_\_\_\_ Manic Depression  
 \_\_\_\_\_ Nerve Trouble \_\_\_\_\_ Schizophrenia  
 \_\_\_\_\_ Panic Disorder \_\_\_\_\_ Obsessive Compulsive Disorder (OCD)
9. If you checked any of the items in number 5 above, please write the name of the medication and discuss how long you have been taking each medication.

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**10. About your amputation:****a. Reason for the amputation (Check One):**

- 1) Combat related: \_\_\_\_\_
- 2) Motor vehicle accident: \_\_\_\_\_
- 3) All Terrain Vehicle (ATV) accident: \_\_\_\_\_
- 4) Diabetes complication: \_\_\_\_\_
- 5) Other medical complication: \_\_\_\_\_
- 6) Other (Specify): \_\_\_\_\_

b. Which limb(s) was removed: Right Arm \_\_\_ Left Arm \_\_\_ R. Leg \_\_\_ L. Leg \_\_\_

c. Do you still have the knee or elbow of the amputated limb? YES \_\_\_ NO \_\_\_

d. How many surgeries have you had on your amputated limb? \_\_\_\_\_

e. Did your stump (remaining limb) get infected after surgery? YES \_\_\_ NO \_\_\_

11. Did you have pain in the part of the limb, which was removed **BEFORE** the amputation?  
YES \_\_\_ NO \_\_\_

If YES: for how long did you have pain in the limb? \_\_\_\_\_

Please check ALL of the words that describe what your pain was like **BEFORE** your limb/s was amputated.

Throbbing \_\_\_ Shooting \_\_\_ Stabbing \_\_\_ Sharp \_\_\_  
Cramping \_\_\_ Gnawing \_\_\_ Hot-burning \_\_\_ Aching \_\_\_ Heavy \_\_\_  
Tiring-exhausting \_\_\_ Splitting \_\_\_ Sickening \_\_\_ Fearful \_\_\_  
Tender \_\_\_ Cruel-punishing \_\_\_

12. Did you know any amputees before your amputation? YES \_\_\_ NO \_\_\_

If YES: who were they (for example: friend, uncle, etc.)? \_\_\_\_\_

13. Do you currently use a prosthetic device (artificial limb) regularly? YES \_\_\_ NO \_\_\_

If YES: How many days per week do you use it? \_\_\_\_\_

How many hours per day do you use it? \_\_\_\_\_

If NO: Why don't you use a prosthetic device? \_\_\_\_\_

### STUMP PAIN

14. Does your stump hurt? YES \_\_\_ NO \_\_\_

If YES: (a) How often do you have stump pain? \_\_\_\_\_ # of days per month

\_\_\_\_\_ # of hours per day

(b) Have you had treatment for it? YES \_\_\_ NO \_\_\_

(c) Do you take medicine for the pain in your stump? YES \_\_\_ NO \_\_\_

(d) What does the doctor say is wrong with your stump? \_\_\_\_\_

15. Describe your stump pain and what it feels like to you as best you can. \_\_\_\_\_

**PHANTOM SENSATIONS / FEELINGS. NOT STUMP PAIN**

**16.** Do you have any sensations / feelings from the part of the limb that was removed (phantom limb-NOT stump)? YES \_\_\_ NO \_\_\_

If YES: **(a)** What part or parts of the phantom do they seem to come from? \_\_\_\_\_  
\_\_\_\_\_

**(b)** What do the sensations feel like (for instance: warm, squeezing, etc.)? \_\_\_\_\_  
\_\_\_\_\_

**(c)** Do the feelings/sensations ever make you a little uncomfortable? YES \_\_\_ NO \_\_\_

**(d)** How strong are the non-painful feelings? If these feelings were painful, how strong would you rate them on a 0 to 10 scale? \_\_\_\_\_

**PHANTOM PAIN ONLY**

**17.** Did you ever have any pain at all in the part of the limb that was removed after your amputation (phantom pain – NOT stump pain)? YES \_\_\_ NO \_\_\_

If YES: **(a)** How long after surgery did you notice the phantom pain? \_\_\_\_\_

If YES: **(a)** A few months after phantom pain began, did the phantom pain:

- |                                 |       |
|---------------------------------|-------|
| <b>1)</b> Go away?              | _____ |
| <b>2)</b> Decrease greatly      | _____ |
| <b>3)</b> Stay the same         | _____ |
| <b>4)</b> Increase in intensity | _____ |

**(b)** How often do you have phantom pain? \_\_\_\_\_ # of days per month  
\_\_\_\_\_ # of hours per day

**(c)** When the pains come, how long do they last?  
Seconds, hours, days, months, etc.) \_\_\_\_\_

**(d)** What part or parts of the phantom does the pain come from? \_\_\_\_\_  
\_\_\_\_\_

**(e)** What do they feel like? \_\_\_\_\_  
\_\_\_\_\_

**(f)** On the 0-10 scale, what is the worst it ever hurts? \_\_\_\_\_

**(g)** On the 0-10 scale, what is the least it hurts? \_\_\_\_\_

**(h)** On the 0-10 scale, what is the usual amount it hurts? \_\_\_\_\_



- (i) Did you ever talk to a doctor about the phantom pain? YES \_\_\_ NO \_\_\_  
If YES: What did the doctor tell you and what was done as a result?

---

- (j) Did the pain ever get bad enough to ask for treatment? YES \_\_\_ NO \_\_\_  
If YES: What happened?

---

Please list all **treatments** you received for phantom pain/stump pain and say how well they worked: (For Example: medication, PT, OT, massage, relaxation, etc.)

Name/Type: \_\_\_\_\_ Success: \_\_\_\_\_

Name/Type: \_\_\_\_\_ Success: \_\_\_\_\_

Name/Type: \_\_\_\_\_ Success: \_\_\_\_\_

Name/Type: \_\_\_\_\_ Success: \_\_\_\_\_

(CONTINUE ON BACK IF NECESSARY)

- (k) Do you ever take medicine for the phantom limb/stump pain?  
YES \_\_\_ NO \_\_\_

If YES: 1) List all medication: \_\_\_\_\_

2) How often do you use this medication? \_\_\_\_\_

3) How well does it control the pain? \_\_\_\_\_

- (l) Does the phantom limb/stump pain ever prevent you from doing things you would like to do? YES \_\_\_ NO \_\_\_

- (m) If you felt pain before amputation, is the phantom pain similar to that pain?  
NO PAIN BEFORE \_\_\_ YES \_\_\_ NO \_\_\_

- (n) If you felt pain before amputation, is the phantom pain similar in location?  
NO PAIN BEFORE \_\_\_ YES \_\_\_ NO \_\_\_

- (o) If you felt pain before amputation, is the phantom pain similar in quality?  
NO PAIN BEFORE \_\_\_ YES \_\_\_ NO \_\_\_

**18.** Does your phantom limb ever feel like it is not in the right position? Almost like it is twisted or contorted?

YES \_\_\_ NO \_\_\_

If YES: Please describe what it feels like to you and how often it feels this way.

---



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**19.** Have you noticed that your phantom is shrinking or changing shape? YES \_\_\_ NO \_\_\_

If YES: Please describe what it feels like to you and how often it feels this way.

---



---

**20.** What are you currently doing to control the pain in your stump / phantom limb? Please check all that apply.

- |   |   |  |
|---|---|--|
| <input type="checkbox"/> Outpatient therapy | <input type="checkbox"/> Breathing Techniques   | <input type="checkbox"/> Watch TV      |
| <input type="checkbox"/> Support group      | <input type="checkbox"/> TENS Unit              | <input type="checkbox"/> Exercise      |
| <input type="checkbox"/> Counseling         | <input type="checkbox"/> Spinal Cord Stimulator | <input type="checkbox"/> Alcohol       |
| <input type="checkbox"/> Relaxation         | <input type="checkbox"/> Epidural Injections    | <input type="checkbox"/> Illegal drugs |
| <input type="checkbox"/> Massage            | <input type="checkbox"/> Nerve Block            | <input type="checkbox"/> Hypnosis      |
| <input type="checkbox"/> Medication         | <input type="checkbox"/> Walking                | <input type="checkbox"/> Other         |
| <input type="checkbox"/> Distraction        | <input type="checkbox"/> Hot Bath               | <input type="checkbox"/> Other         |

**21.** Is there anything that you do that contributes to having more pain or sensations in your phantom limb/stump?

---



---

**22.** Is there anything that you do that makes the pain noticeably better?

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**23.** Please make any additional comments that you feel are important to know regarding your phantom limb sensations, phantom limb pain, and/or stump pain.

APPENDIX H:

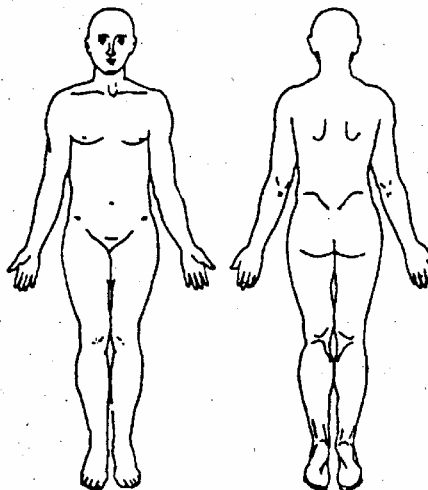
McGill Pain Questionnaire

Patient's Name \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_ am/pm

PRI: S \_\_\_\_\_ A \_\_\_\_\_ E \_\_\_\_\_ M \_\_\_\_\_ PRI(T) \_\_\_\_\_ PPI \_\_\_\_\_  
 (1-10) (11-15) (16) (17-20) (1-20)

1 FLICKERING QUIVERING PULSING THROBBING BEATING POUNDING	11 TIRING EXHAUSTING
2 JUMPING FLASHING SHOOTING	12 SICKENING SUFFOCATING
3 PRICKING BORING DRILLING STABBING LANCINATING	13 FEARFUL FRIGHTFUL TERRIFYING
4 SHARP CUTTING LACERATING	14 PUNISHING GRUELING CRUEL VICIOUS KILLING
5 PINCHING PRESSING GNAWING CRAMPING CRUSHING	15 WRETCHED BLINDING
6 TUGGING PULLING WRENCHING	16 ANNOYING TROUBLESOME MISERABLE INTENSE UNBEARABLE
7 HOT BURNING SCALDING SEARING	17 SPREADING RADIATING PENETRATING PIERCING
8 TINGLING ITCHY SMARTING STINGING	18 TIGHT NUMB DRAWING SQUEEZING TEARING
9 DULL SORE HURTING ACHING HEAVY	19 COOL COLD FREEZING
10 TENDER TAUT RASPING SPLITTING	20 NAGGING NAUSEATING AGONIZING DREADFUL TORTURING
	PPI
	0 NO PAIN
	1 MILD
	2 DISCOMFORTING
	3 DISTRESSING
	4 HORRIBLE
	5 EXCRUCIATING

BRIEF _____	RHYTHMIC _____	CONTINUOUS _____
MOMENTARY _____	PERIODIC _____	STEADY _____
TRANSIENT _____	INTERMITTENT _____	CONSTANT _____



E = EXTERNAL  
I = INTERNAL

COMMENTS:

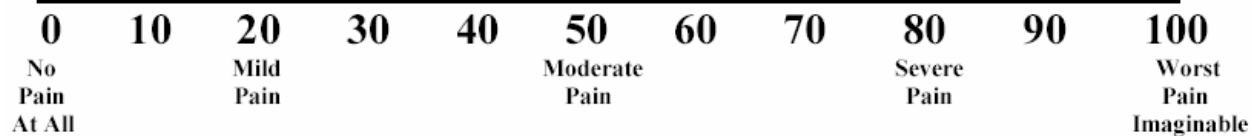
## APPENDIX I:

## Numerical Rating Scale – Daily Pain Rating Scale (DPRS)

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Daily Pain Rating Scale (Week 0)**

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
<b>Rate Pain Intensity For The Day (0 – 100)</b>							
<b>Pain Location</b>							
<b>Anything Different You Notice About Your Pain</b>							



## APPENDIX J:

## Numerical Rating Scale – Prehypnotic Pain Scale (PPS)

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**PPS**

Please rate your **PRESENT** pain intensity using the scale below from 0 to 100 with 0 being equal to “no pain at all” and 100 being equal to the “worst pain imaginable.” The higher the number the more pain you are experiencing currently. You are rating the pain that you are currently experiencing right now in your phantom limb or in your stump.

---

<b>0</b>	<b>10</b>	<b>20</b>	<b>30</b>	<b>40</b>	<b>50</b>	<b>60</b>	<b>70</b>	<b>80</b>	<b>90</b>	<b>100</b>
No Pain At All		Mild Pain			Moderate Pain			Severe Pain		Worst Pain Imaginable

**What is your current pain (0 – 100)?** \_\_\_\_\_

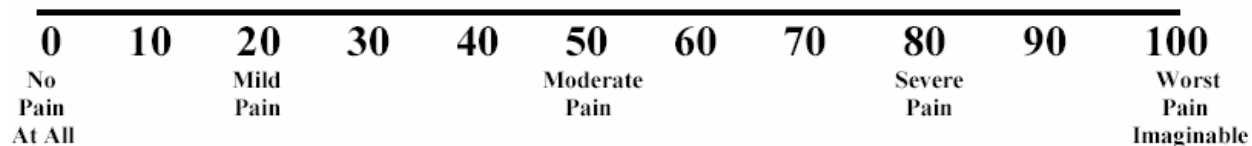
## APPENDIX K:

## Numerical Rating Scale – Posthypnotic Pain Rating Scale (PPRS)

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**PPRS**

Please rate your **PRESENT** pain intensity using the scale below from 0 to 100 with 0 being equal to “no pain at all” and 100 being equal to the “worst pain imaginable.” The higher the number the more pain you are experiencing currently. You are rating the pain that you are currently experiencing right now in your phantom limb or in your stump.



What is your current pain (0 – 100)? \_\_\_\_\_

## APPENDIX L:

**AGE REGRESSION INDUCTION**

Take a deep breath in and hold it for a long moment ... and as you exhale imagine all of the days stress just floating away from you...just moving further and further away from you. Taking another deep breath in and holding it and as you exhale feel all of the days stress just leaving your mind and body.

(Progressive muscle relaxation or other induction)

You're whole body is now totally and completely relaxed, from the top of your head to the tips of your toes. And as your body relaxes so does your mind. And as your mind relaxes just begin to notice a beautiful sunset in front of you. Begin noticing all of the details such as the puffy clouds in the sky, the colors, the sun slowly going down, going down and down, deeper and deeper. And the sky is ablaze with an abundance of colors of crimson and bright purple and blue yellow streaks. And it's a beautiful evening - your mind relaxes and just lets go, releasing all of the stresses from your day. Good...just relax more and more deeply relaxed as you notice the colors beginning to change.

And the sun goes further and further down, notice the the hues of purple and crimson changing ever so slightly to deeper hues. Then changing again until only slight pinpoints of light can be seen from between the clouds. Soon even the pinpoints of light begin to fade and you notice how black it has gotten. The sky is a beautiful velvety black color. Very comforting and safe. Notice that far off in the distance is a star beginning to twinkle. You may really have to look to find it, but you will notice the light is beginning to grow from this single star. Now keep your mind focused completely on that star. Nothing else matters except this beautiful single solitary sparkling star in the sky.

And it's a beautiful night. The temperature is perfect for you. The air has a clean, crisp smell to it, and you feel really great. The light from the star is just enough to see around you. You feel so safe and warm in this place. So safe, so comfortable, so relaxed and at peace.

I want you to notice that sitting beside you is a beautiful blanket with several items on it. Notice that as you look you can now see the shimmer of the blanket and the book that is lying upon it. Also feel around on the blanket until you find 3 rocks...Just begin to feel the rocks one by one in your hand. Notice the texture of the rocks. What do they feel like? Are they rough, smooth, soft, or something else? How heavy are the rocks? These rocks are special rocks...they are called star rocks. Star rocks are healing rocks that will also assist you in going deeper into the experience of hypnosis.

Think of a number now between 0 and 100 that represents how deeply hypnotized you are right now... Know that 0 represents that you are not hypnotized at all and 100 represents that you are as hypnotized as you could ever be. Think of that number now. Then in a moment and not before I tell you I want you to take one of the rocks into your hands and I want you to throw that rock up into the night's sky. You will take that rock and throw it into the sky and as you do you will see that number you just thought of doubling. You will go deeper and deeper into hypnosis with each rock you throw. Throw the first rock as hard as you can into the sky! Watch it go deeper and deeper into the night, farther and farther...deeper and deeper until suddenly there is a burst of light into the night's sky and a star is born. Two stars are now in the sky. What a beautiful sight it was to watch that. Notice how much more relaxed you are and you can still go deeper yet. Throw that next rock now! Throw it hard and fast. Notice the wind from the release. Watch as it goes up and up, deeper and deeper, doubling your number again, going as deeply as possible, and still deeper yet. Suddenly



there is a burst of light into the night's sky and the third star is born. What a beautiful sight! One last rock, this time throw that rock as hard and as fast as you can. Knowing that you will go deeper and deeper, more and more comfortably relaxed as the rock reaches the night's sky and when it does you will be as deeply relaxed as possible. Watch now as the fourth star appears in the sky. Notice how wonderful the sky looks with those beautiful bright stars in the sky.

Take a moment now to breath and enjoy the view while comfortably sitting on your blanket. The light from the sky is now very much brighter out. Those stars are shinning directly on you. Even though it is night out you are enveloped in a shroud of light. Healing warm light.

Take a moment and pay particular attention to your stump and phantom limb. Notice what it feels like at this moment. Notice if there is any sensation at all or if the stump or phantom limb feels pleasant right now. Is there any area that is uncomfortable, painful, hot, tingling, or any other sensation that you notice?

Good - now if there is any discomfort at the moment...I want you to intensify it... just for a moment or two...make it stronger and slightly nod when you have done this.

Okay, now that you've increased that pain or sensations... you realize that if you can increase it then you can also decrease it. So I want you to turn the volume down - just a level or two - and let me know you have done this with a slight nod. Let me know when you have decreased the pain and sensations to a more pleasant comfortable level.

I bet you did not realize that you had that much control over your pain. You have control over a lot of things you perhaps weren't aware of. But now that

you are aware... you can both increase and decrease your pain...you can begin to decrease it by simply taking one satisfyingly deep breath in and putting your finger and thumb together and imagining yourself back at this beautiful place and the relaxation and comfort will wash over you. Each time you take one deeply satisfying breath in and put your finger and thumb together with the intention of deep relaxation your mind will automatically begin the relaxation process and you will find that every time you go deeper and deeper into total relaxation and comfort. You are in control and you can easily return to this comfortable pleasant place by simply taking one satisfyingly deep breath in, touching your finger and thumb together and imagining yourself back at your beautiful place. You will notice that each time you do this that the relaxation washes over you more deeply than the time before and it becomes easier and easier to return to this deeply comfortable place. Now you've learned to control your pain and you can practice decreasing it every day in your own time - until it gets easier and easier.

As we begin to work together just notice that at times your mind may start to drift off as if you are day dreaming. Do not worry about that. Some part of you will continue to listen intently on each word that I say. One part of your mind may drift off and another part is hearing everything I say as I offer suggestions and instructions. Remain focused on my voice and work to block out any other sounds that you hear. Just stay focused on my voice.

Now pick up the book that you saw earlier on your blanket. Do not open it until I request you to do so. Notice that this is your book. This book is about you and your life. Everything that you have ever said or done is in this book. Everything you have ever experienced or felt is in this book. This is the book of your life. I want you to turn to pages towards the end of the book and open it now. Notice that you can't see anything written on these pages as they haven't been experienced. This is a part of your life that you haven't experienced yet.

This is your future. Now open the book to the middle. This is where you are at currently. This is everything that you are at this moment.

In a moment and not before, I am going to count backwards from 10 to 1 and I want you to listen carefully as I do so and follow my instructions as closely as you can. With each number that I say you are going to find that you go even deeper into pleasant relaxation. With each number that I say you will turn a page in the book going from the back towards the front. You may skip a page or more with each number. With each turn of the page you will find that you are getting younger and younger going back in time. Going back to the time before your amputation. Before you had so much uncomfortableness and pain in your life. So as you turn each page in the book just notice that you are moving closer and closer to a pleasant experience before your limb was amputated. Back to the time when you felt healthy and well. Before you had pain in your limb and back to a happy time, a pleasant time. When you felt good about yourself. So by the time I reach NUMBER 1... you will be at that time in your life before your limb was amputated and before you had pain in that limb. You will be at a pleasant experience.

Let us begin now...**10**...turning the page on your life...going back in time...back to a pleasant time...going deeper and deeper...**9**...turning another page...getting younger and feeling better...letting go more and more...**8**...turn the page...deeper and deeper...more pleasantly relaxed than before...younger still...**7**...going back to a happy time in your life...a pleasant time...a time when you felt healthy and whole...**6**...turning yet another page in your life...becoming younger still...going back further and further...more and more...younger and younger...**5**...half way there...enjoying this time of comfort...deeper and deeper still...**4**...going back to a happy place in your life...a time when you felt healthy and whole...going back to that special time...**3**...almost there...younger and

younger...turning the pages on your life...deeper and deeper...more and more comfortable...**2**...almost there...almost to that happy pleasant time in your life when you felt healthy and whole...**1**...be there now! You are at that healthy and happy time in your life. Experience this time as fully as possible on all levels. Notice how wonderful and whole your body is feeling. Notice what you look like with all of your limbs intact. See how well you can walk and move around. Feel how wonderful your legs/arms are feeling at this time. Feel your heart beating as it pumps the blood through your limbs. Notice what it feels like to have your limb intact again. Take a moment now to enjoy this time and be present for this experience. Allow yourself to be healthy and whole as fully as possible. Feel your brain and body integrating this experience on all levels. (2 Minute pause)

Good...take a deep breath in, hold it for a moment, and as you exhale notice how healthy and whole you feel at this moment. Notice how well your blood is circulating throughout your entire body...you feel great! Now take your book in your hand and find the pen that is next to you. I want you to open your book up to the page that is just before your surgery and just before your amputation. I want you to write in your book in large letters that you are pain free and you have been so for quite some time. That your pain is completely controlled and you are not in pain. See yourself writing this and know it is true as this is the time you are at right now. You are healthy and whole. We are rewriting the pain memory to read that the pain switch can get turned off as there is no pain. Read this to yourself several times. I am pain free and I have been so for quite some time. My pain is completely controlled and I am not in pain. Notice how your brain is also rewriting this memory. That switch does not have to remain on anymore as the pain has been taken care of.

Now I am going to count forward from 1 to 5 and when I reach 5 you will be back at your beautiful place looking at the night's sky feel comfortable and

pleasant. Turning the pages in your book towards the present. With each page you turn and each number I say you will be returning to your actual age and you will bring with you your total feelings from this happy time in your life of health and wholeness. You are bringing with you your feelings of health and wholeness. Your body feels healthy and well. You are bringing these feelings with you to the present. Okay...1...turning the page and getting a bit older...continuing to feel great and comfortable...2...getting older still...coming slowly back to the present time....feeling healthy and whole...bringing all those good feelings with you...3...halfway there...feeling healthy and well...your body is comfortable and pleasant...4...almost there now...getting older still...feeling great...and 5...back at your beautiful place your regular age feeling great and relaxed. Notice that you were able to bring these whole feelings with you to your present state of relaxation. You did great!

Now I want you to remember that everyday you can return to this comfortable place by simply taking one deeply satisfying breath in, putting your finger and thumb together, and imaging yourself back in your beautiful place. You will find that each time you do this it becomes easier and easier to reach deeper levels of relaxation. It is easy and effortless. You may also notice that everyday your body feels more healthy and whole. When it is not feeling healthy and whole you can simply come back to this place and imagine that you are flicking a switch to turn off those uncomfortable and painful feelings. You may find that your body feels better as the day goes on, as the weeks go on, and especially as the months go on. Each day you improve more and more. Feeling better everyday. Taking those healthy and whole feelings with you into the future. You even notice that you feel better and better about yourself, about life, and about your body.

Now it is time to return and I will count you back from 10 to 1 and at five not sooner you will open your eyes, but not be fully aroused until I reach one. At one you will be fully awake and alert bringing those pleasant feelings and sensations with you. Ready...**10 – 9 – 8 – 7 - 6...5...open your eyes...4 - 3...almost there...2...1...Now you feel wide awake and alert! Wide awake and alert!**

## APPENDIX M:

**Phantom Limb Pain Debriefing – Hypnosis Group**

Thank you for choosing to participate in this dissertation research. The purpose of this research was to find out how well hypnosis works to decrease or alleviate stump and phantom limb pain intensity with three treatments of hypnosis.

Participants were broken down into two groups: the hypnosis treatment group and the waitlist control group. You were part of the hypnosis group.

Several things were looked at as part of this research project. First, your Daily Pain Rating Scale assisted in logging any fluctuations you may have had over the course of the 4 weeks. This also recorded any decrease in pain intensity or changes in your pain as a result of your hypnosis treatments. Similarly, for the Prehypnotic Pain Scale and the Posthypnotic Pain Rating Scale the research team looked for decreases in pain intensity as a result of the hypnosis. The McGill Pain Questionnaire looked at the types of words chosen to describe your pain and overall if there were any patterns that emerged in regard to pain descriptors within the hypnosis group and control group. Further, changes in pain intensity were noted from your baseline scores to your post experiment scores.

Any questions, comments, or problems please feel free to contact Julie Rickard (304-341-1506), my faculty sponsor John Linton, Ph.D. (304-341-1500), or my dissertation chair person Arreed Barabasz, Ph.D. (509-335-7016).

Thank you again for your time and cooperation. It is greatly appreciated!

Julie Rickard  
Psychology Intern

## APPENDIX N:

**Phantom Limb Pain Debriefing – Waitlist Control Group**

Thank you for choosing to participate in this dissertation research. The purpose of this research was to find out how well hypnosis works to decrease or alleviate stump and phantom limb pain intensity with three treatments of hypnosis.

Participants were broken down into two groups: the hypnosis treatment group and the control group. You were part of the waitlist control group.

Several things were looked at as part of this research project. First, your Daily Pain Rating Scale assisted in logging any fluctuations you may have had over the course of the 4 weeks. This also recorded any decrease in pain intensity or changes in your pain as a result of your participation. The McGill Pain Questionnaire looked at the types of words chosen to describe your pain and overall if there were any patterns that emerged in regard to pain descriptors within the hypnosis group and control group. Further, changes in pain intensity were noted from your baseline scores to your post experiment scores.

Because you were part of the control group, you did not have the opportunity to experience the potential benefits of hypnosis. As such, you are welcome to take part in the hypnosis treatment group to see if it would benefit you. If you are interested, please let Julie Rickard know and she will give you a schedule of dates available for the hypnosis treatment. If you are interested in participating, you will be asked to continue monitoring your pain using the same scales you have been using.

Any questions, comments, or problems please feel free to contact Julie Rickard (304-341-1506), my faculty sponsor John Linton, Ph.D. (304-341-1500), or my dissertation chair person Arreed Barabasz, Ph.D. (509-335-7016).

Thank you again for your time and cooperation. It is greatly appreciated!

Julie Rickard  
Psychology Intern



## APPENDIX O:

**Charleston Area Counselors & Psychologists**

The agencies listed below will work on a reduced fee basis and take Medicaid/medicare.

**WVU School of Medicine**  
**Department of Behavioral Medicine & Psychiatry**  
501 Morris St.  
Charleston, WV 25326  
304-341-1500

**CAMC Family Resource Center**  
**Woman and Children's Hospital**  
800 Pennsylvania Ave.  
Charleston, WV  
388-2545

**Family Service of Kanawha Valley**  
922 Quarrier St.  
Charleston, WV  
340-3676

**Pretera Center**  
511 Morris St.  
Charleston, WV  
341-0511

**Kanawha Pastoral Counseling Center, Inc.**  
16 Leon Sullivan Way  
Charleston, WV  
346-9689

**New Hope Christian Counseling Center**  
5130 MacCorkle Ave  
Charleston, WV  
926-8600

## APPENDIX P:



Office of Grant and Research Development

**MEMORANDUM**

**TO:** Julie A. Rickard  
Educational Leadership & Counseling Psychology, WSU Pullman (2136)

**FROM:** Jamie Murphy (for) Cindy Corbett, Chair, WSU Institutional Review Board *gm*

**DATE:** 19 May 2004

**SUBJECT:** Review of Protocol Modification - Modification

Your proposal to modify the protocol titled *"Effects of Hypnosis in the Treatment of Residual Stump and Phantom Limb Pain,"* IRB File Number **6042-b** was reviewed for the protection of the subjects participating in the study. Based on the information received from you, the IRB has **approved** your modification request on **19 May 2004**. This modification includes a change in how subjects are being recruited, a change in the compensation and an updated consent form.

IRB approval indicates that the modifications described to the previously approved study protocol are designed to adequately protect the subjects participating in the study. This approval does not relieve the investigator from the responsibility of providing continuing attention to ethical considerations involved in the utilization of subjects participating in the study.

**The approval for this protocol expires 25 March 2005.** If any more changes are made to the study protocol you must notify the IRB and receive approval before implementation.

If you have questions, please contact the Institutional Review Board at OGRD (509) 335-9661. Any revised materials can be mailed to OGRD (Campus Zip 3140), faxed to (509) 335-1676, or in some cases by electronic mail, to [ogrd@mail.wsu.edu](mailto:ogrd@mail.wsu.edu).

Review Type: MOD  
Review Category: EXP  
Date Received: 3 May 2004

OGRD No.: NF  
Agency: NA

**MEMORANDUM**

**TO:** Julie A. Rickard  
 Educational Leadership & Counseling Psychology, WSU Pullman (2136)

**FROM:** Jamie Murphy (**for**) Cindy Corbett, Chair, WSU Institutional Review Board (3140) 

**DATE:** 26 March 2004

**SUBJECT:** Approved Human Subjects Protocol - New Protocol

Your Human Subjects Review Summary Form and additional information provided for the proposal titled *"Effects of Hypnosis in the Treatment of Residual Stump and Phantom Limb Pain,"* IRB File Number **6042-a** was reviewed for the protection of the subjects participating in the study. Based on the information received from you, the WSU-IRB **approved** your human subjects protocol on **26 March 2004**.

IRB approval indicates that the study protocol as presented in the Human Subjects Form by the investigator, is designed to adequately protect the subjects participating in the study. This approval does not relieve the investigator from the responsibility of providing continuing attention to ethical considerations involved in the utilization of human subjects participating in the study.

**This approval expires on 25 March 2005. If any significant changes are made to the study protocol you must notify the IRB before implementation.** Request for modification forms are available online at <http://www.ogrd.wsu.edu/Forms.asp>.

**In accordance with federal regulations, this approval letter and a copy of the approved protocol must be kept with any copies of signed consent forms by the principal investigator for THREE years after completion of the project.**

This institution has a Human Subjects Assurance Number FWA00002946 which is on file with the Office for Human Research Protections. WSU's Assurance of Compliance with the Department of Health and Human Services Regulations Regarding the Use of Human Subjects can be reviewed on OGRD's homepage (<http://www.ogrd.wsu.edu/>) under "Electronic Forms," OGRD Memorandum #6.

If you have questions, please contact the Institutional Review Board at OGRD (509) 335-9661. Any revised materials can be mailed to OGRD (Campus Zip 3140), faxed to (509) 335-1676, or in some cases by electronic mail, to [ogrd@mail.wsu.edu](mailto:ogrd@mail.wsu.edu).

Review Type: NEW  
 Review Category: EXP  
 Date Received: 12 March 2004

OGRD No.: NF  
 Agency: NA



Charleston Area  
Medical Center



ROBERT C. BYRD  
HEALTH SCIENCES CENTER

OF WEST VIRGINIA UNIVERSITY/CHARLESTON DIVISION

March 29, 2004

Julie A. Rickard, BS  
WVU Dept of Behavioral Medicine & Psychiatry  
501 Morris Street; PO Box 1547  
Charleston, WV 25326

RE: Your response dated March 29, 2004 regarding study number 04-03-1583: Effects of Hypnosis in the Treatment of Residual Stump Pain and Phantom Limb Pain

Dear Ms. Rickard:

Thank you for your response to requests from a prior full board review of your application for the new study listed above. This type of response qualifies for expedited review under FDA and DHHS (OHRP) regulations. The expedited review was approved by the Vice Chair.

This is to confirm that your application is now fully approved. The protocol version received 3/29/2004 is approved. The consent form version dated March 29, 2004 with the HIPAA Authorization is approved. You must obtain signed written consent and signed HIPAA authorization from all subjects. The data set associated with this study is considered identifiable.

You are granted permission to conduct your study as most recently described effective immediately. The study is subject to continuing review on or before **March 22, 2005**, unless closed before that date.

Please note that any changes to the study as approved must be promptly reported and approved prior to implementation. Some changes may be approved by expedited review; others require full board review. Also, serious and/or unanticipated adverse events must also be reported as required by law and in accordance with CAMC/WVU Charleston IRB policies. Contact the CAMC/WVU Institutional Review Board office (388-9971; fax 388-9976) if you have any questions or require further information. Your continued cooperation is appreciated.

Sincerely,

A handwritten signature in cursive script that reads "Harry L. Reahl".

Harry L. Reahl, MD  
Vice Chair, Institutional Review Board

cc: John C. Linton, PhD, Faculty Advisor  
Patti Salisbury, Sponsored Project Coordinator



April 28, 2004

Julie A. Rickard, BS  
WVU Dept of Behavioral Medicine & Psychiatry  
501 Morris Street; PO Box 1547  
Charleston, WV 25326

RE: Your application dated April 19, 2004 regarding study number 04-03-1583: Effects of Hypnosis in the Treatment of Residual Stump Pain and Phantom Limb Pain

Dear Ms. Rickard:

Your request for revision of the study listed above was reviewed at the April 27, 2004, meeting of the CAMC/WVU Institutional Review Board for the Protection of Human Subjects. The minutes from the meeting noted that the following persons were not present or absented themselves from the discussion (unless invited to participate in the discussion by the IRB) of the study and abstained from voting due to possible conflict of interest: Dr. John C. Linton.

The requested revision involves changes to the protocol and consent form. This is to confirm that your application for revision described as Amendment 1 dated April 19, 2004 is approved. The consent form version dated April 19, 2004 is approved. You must obtain signed written consent and signed HIPAA authorization from all subjects.

You are granted permission to conduct your study as revised effective immediately. The date for continuing review remains unchanged at **March 22, 2005**, unless closed before that date.

Please note that any further changes to the study must be promptly reported and approved prior to implementation. Some changes may be approved by expedited review; others require full board review. Also, serious and/or unanticipated adverse events must be reported as required by law and in accordance with CAMC/WVU Charleston IRB policies. Contact the CAMC/WVU Institutional Review Board office (388-9971; fax 388-9976) if you have any questions or require further information. Your continued cooperation is appreciated.

Sincerely,

A handwritten signature in cursive script that reads 'Harry L. Reahl'.

Harry L. Reahl, MD  
Vice Chair, Institutional Review Board

cc: John C. Linton, PhD, Faculty Advisor