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MEDICAL HYPNOSIS AND ORTHOPEDIC HAND SURGERY: PAIN PERCEPTION, POST-OPERATIVE RECOVERY, AND ADHERENCE

by
Magaly Hettinga Mauer

A DISSERTATION

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MEDICAL HYPNOSIS AND ORTHOPEDIC HAND SURGERY: PAIN PERCEPTION, POST-OPERATIVE RECOVERY, AND ADHERENCE

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Orthopedic hand-surgery patients experience severe pain post-operatively, yet they must engage in painful exercises and wound-care shortly after surgery; poor involvement results in complications that may lead to loss of function and/or disfigurement. This study tested a cognitive-behavioral intervention including relaxation, imagery, and therapeutic suggestions (hypnosis) designed to reduce pain perception, enhance post-surgical recovery, and facilitate rehabilitation.

Sixty hand-surgery patients at a large urban county hospital were divided into two groups which were randomly assigned to usual-treatment or usual-treatment plus hypnosis. The intervention was administered daily for four days. Outcome measures were : a) daily self-ratings of patient's perceived pain, suffering, state-anxiety, and comfort during occupational therapy (OT); b) occupational therapists' ratings of patients' cooperation and observed comfort at two time-points during intervention; c) surgeons' ratings of treatment progress at two time-points during hospitalization; d) length of hospitalization; e) amount of analgesics used; and f) complications.

Significant between-groups differences for perceived pain, suffering, and state-anxiety were found using MANOVA (Hotelling's = .79, exact $F(3,43) = 11.30$, $p = .000$). By Day Four, and after controlling for gender, race, and pre-treatment scores, hypnosis explained a significant amount of variance in pain (R^2 Change = .17, $F_{change} = 9.11$, $p = .0022$), suffering (R^2 Change = .30, $F_{change} = 17.92$, $p = .0000$) and state-anxiety (R^2 Change = .15, $F_{change} = 11.41$, $p = .0008$). There were no differences in analgesic use.

Hypnosis had significant effects on treatment progress at Time 1 ($F(2,44) = 11.70$, $p = .000$) and Time 2 ($F(2,44) = 9.99$, $p = .002$) . Hypnosis was negatively associated with complications

(χ^2 (1, N= 60) = 7.067, p = .008; Spearman's r = -.392, t = -3.247, p = .002). There were no between-group differences in length of hospitalization.

Hypnosis subjects reported greater comfort during OT than controls at Time 1 ($F(2,45)$ = 11.69, p = .000) and Time 2 ($F(2,45)$ = 7.71, p = .004). No between-groups differences were found for observed comfort or cooperation with OT.

These results indicate that cognitive-behavioral intervention with hypnotic suggestion can reduce patients' post-surgical perceived pain, suffering, and anxiety; decrease co-morbidity; and enhance post-surgical recovery and rehabilitation. Further research is needed to determine the generalizability of these findings to other orthopedic patient populations.

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A dissertation is necessary only if one has been admitted to a doctoral program. I will forever be grateful to Dr. Robin Burhke, acting Training Director at the time of my admission, for her help and support during the application and selection process.

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CHAPTER I

INTRODUCTION

Although most orthopedic hand surgery patients experience severe pain post-operatively, they must participate actively in painful rehabilitative exercises and wound care shortly after surgery; poor adherence to the rehabilitation regimen results in complications that may lead to loss of function and/or disfigurement. The purpose of this study was to analyze the effects of a psychological treatment consisting of relaxation and therapeutic suggestions (medical hypnosis) on measures of perceived pain intensity (PPI), perceived pain affect (PPA; also known as suffering), state anxiety (SANX), surgical recovery, adherence, and rehabilitation in an orthopedic hand surgery sample.

General Overview

Pain is subjective and multidimensional (Sternbach, 1986; Wall & Womack, 1989). Although much money, energy, and human resources are spent attempting to understand and control pain, we still do not know enough about it to treat it adequately (Hart, 1991), especially in regard to the acute pain associated with noxious medical procedures (Holzman & Turk, 1986; Park & Fulton, 1991; Smith & Covino, 1985; Turk, Meichenbaum, & Genest, 1983).

Surgical procedures are inherently painful and usually accompanied by anxiety. Anxiety is believed to increase the patient's level of perceived pain (Barber, 1982; Benedetti & Murphy, 1985; Sternbach, 1986; Turk, Meichenbaum, & Genest, 1983). Acute pain has been found to interfere with the body's natural healing response (Hall, 1986; Holden-Lund, 1988; Park & Fulton, 1991; Sunnen, 1988); to increase morbidity (Yates & Smith, 1989); to decrease cooperation with medical staff (Boyne, 1982; Zahourek, 1990); and to negatively affect adherence to medical treatment (Spiegel, 1983; Wain, 1980; Wall & Womack, 1989).

Analgesic medication is the usual treatment for post-surgical pain. However, as with all medications, analgesics can produce noxious side effects and some have the potential for creating addiction (Achterberg, Kenner, & Casey, 1989). Physicians and nurses tend to undermedicate for fear

of creating dependency (Bonica, 1990), which leads to insufficiently relieved pain and unnecessary suffering. Although adjunctive psychological treatments for pain have been shown to reduce or eliminate the need for analgesic medication (Smith & Covino, 1985; Sternbach, 1986), there is a dearth of literature regarding the use of psychological methods of pain control in the recovery and rehabilitation of orthopedic surgery patients (Achterberg, Kenner, & Casey, 1989).

Besides the pain and anxiety usually associated with surgery, orthopedic hand surgery patients are exposed to additional painful stimuli shortly following surgery because early mobilization of hand and fingers is necessary to assure maximum restoration of function. Even brief periods of immobilization have been shown to result in functional impairment (Caillet, 1983). Consequently, these patients must undergo a regimen of acutely painful Occupational Therapy (OT) in order to regain the use of their limb. Non-adherence to the OT treatment often results in a disfigured, useless limb that may require additional surgery and sometimes cannot be made functional at all (Caillet, 1983; Ouellette, personal communication, July 27, 1992).

Relaxation and analgesic suggestion (medical hypnosis) are among the oldest and best documented non-pharmacological treatments for pain (Bernheim, 1902; Hilgard & Hilgard, 1983; Janet, 1925; Turk, Meichenbaum, & Genest, 1983; Weitzenhoffer, 1953). Medical hypnosis was endorsed as an accepted treatment modality by the American Medical Association in 1958, and hypnotic interventions have shown utility in a number of areas of medicine and dentistry.

These areas include the enhancement of post-surgical recovery (Blankfield, 1991; Bowers & Kelly, 1979; Orne & Dinges, 1989) and the control of pain in noxious medical procedures such as debridement of burns, bone marrow aspirations (Ewin, 1986; Kellerman, Zeltzer, Ellenberger, & Dash, 1983; Wall & Womack, 1989), and electromyographic (EMG) testing (Maurer, 1991). Hypnosis has also demonstrated positive results as an adjunct in rehabilitation from cerebral vascular accidents (Allen, 1983) and burns (Crasilneck & Hall, 1975), as well as with problems of lack of adherence to treatment in the rehabilitation of various physical impairments (Appel, 1990).

Although acute pain has been demonstrated to lead to increased morbidity and other noxious effects, only one experimental study (Achterberg, Kenner, & Casey, 1989) dealing with the psychological pain control of general orthopedic trauma has appeared in the literature during the last 20 years. During the 60's and early 70's, two studies using mixed orthopedic samples dealt with the use of hypnotic techniques to enhance the quality of post-surgical recovery (Bartlett, 1966; Bonilla, Quigley, & Bowers, 1961). There are no studies that have specifically examined the control of acute pain associated with orthopedic hand surgery. Clearly, more research is needed with this population.

This study combined extant knowledge in the areas of pain and medical hypnosis in order to design and test an intervention for the control of orthopedic post-surgical pain and the enhancement of post-surgical recovery. Such an intervention was expected not only to lessen human suffering but also to promote faster healing, to reduce the use of analgesic medication, to improve patient cooperation, and to result in better treatment outcomes because of increased treatment adherence.

CHAPTER II

REVIEW OF THE LITERATURE

Scope of the Literature Review

The literature reviewed for this study included articles, books, and dissertations pertaining to pain theories, the psychophysiological determinants of acute pain, acute pain assessment, the management of pain due to medical procedures, the uses of hypnosis in medicine (especially pain control and recovery from surgery), orthopedic surgery rehabilitation, adherence to medical treatment, and methodological issues in medical hypnosis research. Relevant titles were identified through several computer-assisted searches using MEDLINE, PSYCHLIT, and DISSERTATION ABSTRACTS ONLINE. Manual searches were conducted where appropriate. The searches covered the last thirty years except in the case of dissertations which were searched going back to 1980. In addition, the reference lists of comprehensive review articles and dissertations were examined for relevant titles. Only works written in English were included in this review.

Definition of Key Terms

Following are the definitions of some of the constructs used in the present study:

Anxiety. Anxiety refers to the physiological symptoms of autonomic arousal that usually accompany and exacerbate the experience of acute pain. Anxiety can be measured as a trait (T-anxiety) and/or as a state (S-anxiety) by using the appropriate scale of the State-Trait Anxiety Inventory (STAI). T-anxiety is operationally defined as the score obtained on the T-anxiety scale of the STAI; S-anxiety is defined as the score obtained on the S-anxiety scale of the STAI.

Comfort. Perceived comfort (PC) refers to the degree to which post-hypnotic suggestions for increased comfort during OT sessions are carried out by the patient. PC will be measured as the numerical value recorded by the subject on the Numerical Rating Scale-11 (NRS-11) for Perceived Comfort. Observed comfort (OC) refers to level of comfort displayed by the patient during OT sessions as observed by the OT. OC will be operationalized as the number recorded by the OT on the NRS-11 for Observed Comfort.

Cooperation. Cooperation (COOP) refers to the occupational therapist's (OT) perception that a patient shows willingness to follow directions during the therapy. In this study this index will be used as a measure of adherence to medical regimen and is defined as a point on a 7-point Likert scale for Cooperation recorded by the OT.

Hypnosis. For the purposes of this study, hypnosis was defined as a state of enhanced receptivity to suggestions. In this state, the individual responds by experiencing alterations in mood, memory, perception, and physiological function (Barber, 1990, 1991; Erickson, 1989; Orne & Dinges, 1989). Medical hypnosis is the tapping of the hypnotic response for medically therapeutic purposes.

Hypnoanalgesia. Hypnoanalgesia refers to the reduction or elimination of perceived pain dimensions or the increase in comfort level of the patient through the use of hypnotic techniques such as direct or indirect suggestion, displacement, dissociation, time distortion, reinterpretation of the pain experience, or amnesia. The analgesia can be immediate or delayed through the use of post-hypnotic suggestions.

Pain. The International Association for the Study of Pain (IASP) defines pain as the "unpleasant sensory and emotional experience associated with actual or potential tissue damage" (Feuerstein, 1989, p.2).

Pain Affect. Pain affect is thought to be related to both the affective-motivational and cognitive-evaluative dimensions of pain and thus, it is a measure of the suffering and disruption engendered by the pain experience. In the present study, pain affect will be operationalized as the numerical score recorded by the patient on the NRS-11 for Pain Affect.

Pain intensity. Pain intensity, thought to be related to the sensory-discriminative dimension of pain experience, is defined by Jensen and Karoly (1992) as "the quantitative estimate of the severity of felt pain" (p. 137). In this study, pain intensity was operationally defined as the score obtained on the NRS-11 for Pain Intensity.

Literature Review

Pain

The most generally accepted explanation of pain phenomena is the Gate Control Theory of Melzac and Wall (1965). According to this theory, physical and psychological factors come together to form the experience of pain.

Most pain messages are believed to be coordinated in the substantia gelatinosa of the spinal cord and to be controlled by transmission (T) cells in the dorsal horn. These T cells are thought to be the pain gating mechanism that allows pain messages to get through to the brain once the pain reaches sufficient intensity. Pain information is modulated by interactions among the large and small-diameter fibers and other nerve cells in the substantia gelatinosa and the sympathetic ganglia. Additionally, pain messages can be modified by neural input further up the spinal cord or by neural messages descending from the brain (Melzac & Wall, 1965, 1982).

T cells are believed to transmit pain messages to two major brain areas via two different neural systems in the spinal cord (Melzac & Casey, 1968; Melzac & Wall, 1982). One system may be involved in the transmission of the sensory-discriminative dimension of pain (i.e., intensity and type of pain) while the other seems to be involved with the motivational-affective dimension (the unpleasant emotions and motivations that trigger pain responses; also known as suffering). These messages are thought to be carried by medially coursing nerve fibers into the reticular formation, medial and intramedial thalamus, and limbic system areas of the brain.

Melzac and Wall further hypothesized that the neocortex evaluates these inputs along with stored information about past pain experiences while receiving other relevant information about the situation such as degree of danger and availability of help (i.e., expectancies). This is the cognitive-evaluative dimension of pain. The brain integrates and interprets the information, and instantaneously sends messages down the spinal cord to the T cells which further modify incoming pain information.

The gate control theory has provided a link between the physiological and psychological aspects of pain through the recognition of the modulating power of psychological variables (Melzac & Wall, 1982; Weisemberg, 1977). Would a psychological analgesic intervention targeting the pain dimensions proposed by the above mentioned models have a significant effect on acute pain levels due to hand surgery?

Acute pain

Acute pain involves noxious or tissue-damaging stimulation; a series of biochemical events starts at the site of injury, beginning with the release of chemicals (e.g., prostaglandins and bradykinin) that amplify the pain signal. If unblocked, a chemical chain reaction is set in motion and the amplified impulses are sent to the spinal cord. The pain impulse enters the dorsal horn, where neurotransmitters are then released to carry the pain message to the brain. Along the way, pain messages connect with the limbic system, which controls emotional responses (Morris, 1992) and is also believed to be involved in hypnotic responses (Crasilneck & Hall, 1975; Rossi & Cheek, 1988). The perception of pain occurs when the brain is reached.

Acute pain is associated with subjective and objective physical symptoms that include hyperactivity of the autonomic nervous system. The associated emotions are fear and anxious concern for one's well-being. In general, the greater the anxiety, the greater the perception of noxious events as painful. However, although the association between pain and anxiety is strong, the direction of causality is uncertain; high levels of pain can provoke high levels of anxiety and trait anxiety has been associated with higher levels of pain report (Sternbach, 1986).

According to Fordyce (1978), acute pain has four main components: nociception, sensation, suffering, and behavior. Nociception refers to the activation of certain subsets of nerve fibers by mechanical, thermal, or chemical stimulation (Perl, 1980); sensation refers to the sensory qualities of the pain (e.g., intensity, location); suffering has to do with emotional and cognitive factors; and behavior is the outward manifestation of the pain experience.

Biochemical systems involved in the transmission of pain messages are thought to be similar in all humans, but the perception of the pain experience is a purely subjective and idiosyncratic event (Morris, 1992). This may be because people operate under different systems of meaning, which are dependent on cultural and personal experiences (Guidano, 1987; Guidano & Liotti, 1985; Mahoney, 1991). The meaning of pain, then, may be "open to impermanent and social interpretations" (Morris, p. 5).

It follows from Fordyce's (1978) conceptualization that changes in pain behavior would necessitate changes in any or some of the other components. In hand surgery patients, nociception is the result of surgery and thus cannot be changed; but according to Morris (1992), the perceptions of sensation and suffering are affected by alterations in meaning and thus become appropriate targets for psychological analgesic interventions.

Additionally, high levels of anxiety have been demonstrated to influence measures of perceived pain (Hilgard & Hilgard, 1983; Hilgard & LeBaron, 1982; Sacerdote, 1980), and relaxation has shown reductions in anxiety levels and general measures of pain perception (Turk, Meichenbaum, & Genest, 1983).

The Measurement of Pain

Accurate pain assessment must recognize the multidimensionality of pain, and include measurement of intensity and affective levels (Turk & Melzac, 1992). In addition, an ideal pain assessment procedure should meet the criteria proposed by Gracely and Dubner (cited in Price, 1988) and Price: a) have ratio scale properties; b) be relatively free of biases inherent in different psychophysical methods; c) separately assess the sensory, intensive, and affective dimensions of pain; d) provide immediate information about the accuracy and reliability of the subjects' performance of the scaling responses; e) be useful for both experimental and clinical pain and allow for reliable comparisons between the two types of pain; f) be reliable and generalizable; g) be sensitive to changes in pain intensity; h) be simple to use for pain patients and non-pain patients in both clinical and research settings; and i) provide a basis for comparison of human

psychophysical responses to nociceptive neural responses obtained in neurophysiological experiments.

The dimensions of the pain experience that can currently be measured are the sensory-discriminative (pain intensity, type, and location) and the motivational-affective (pain affect). Pain location and type were irrelevant for the purposes of this study. Pain intensity refers to the perceived level of the physical sensation of pain; pain affect refers to the affective response elicited by the perception of pain. Both are subjective events that cannot be measured directly (Jensen & Karoly, 1992). However, in the late 50's, Beecher introduced clinical pain measurement techniques for human analgesic assays by utilizing the patient's subjective responses and his techniques remain in use to date (Wolff, 1986).

Pain Intensity

According to Jensen and Karoly (1992), the three most commonly used methods to measure perceived pain intensity are Verbal Rating Scales (VRS), Visual Analogue Scales (VAS), and Numerical Rating Scales (NRS). Descriptions of each type follow.

Verbal Rating Scales (VRSs). VRSs consist of a list of descriptors of different levels of pain including adjectives that reflect the extremes and sufficient other descriptors to capture the gradations of pain that may be experienced. VRSs assume equal intervals between adjectives but this is unlikely to be the case, making VRS scores in fact ordinal data. This is acceptable when relationships between pain intensity and other factors are being examined, but not if pain ratings are going to be compared across time or between groups as was the case in the present study.

Visual Analogue Scales (VASs). VASs consisting of a line 10 to 15 cm. in length, with each end anchored by descriptors of the extremes of pain (e.g., no pain to pain as bad as it could be), have been found to be sensitive as a measure of change in subjects' pain perception (Scott & Huskisson, 1976; Seymour et al., 1985). Patients are asked to make a mark indicating which point along the line best represents their pain intensity. The distance from the no pain end to the mark is the patient's score.

VASs are easy to administer and score (although scoring involves two steps: measuring with a millimetric ruler and recording the resulting number); they have been shown to have ratio measurement level properties, good criterion-related validity, high sensitivity to change, and have a large number of categories. The disadvantages of the VASs, however, are that they are more time consuming to score than other methods and have an increased possibility of making errors in scoring because of the above mentioned two-step process; also some patients have difficulty understanding and using VAS measures even after careful explanation (Jensen & Karoly, 1992). In this study, the use of VAS measures is complicated, if not prohibited, by the potential physical limitations of the sample (hand surgery may have been performed on the dominant hand).

Numerical Rating Scales (NRSs). NRSs involve asking patients to rate their pain from 0 to 10 (11-point scale) or from 0 to 100 (101-point scale), with the understanding that the 0 represents one end of the pain continuum and 10 or 100 represents the other extreme. NRSs are extremely easy to administer and score and can be used with a greater variety of patients than VASs. The scores obtained with the NRS have ratio properties, allowing for the use of parametric statistics in the analyses.

Historically, the use of NRSs was limited by a lack of comparative studies involving other well-researched measuring instruments. However, the validity of NRSs has now been well documented. Positive and significant correlations with other measures of pain intensity have been found by several investigators (Downie et al., 1978; Jensen et al., 1986, 1989; Kremer et al., 1981; Seymour, 1982; Wallenstein et al., 1980). Sensitivity to treatments affecting pain intensity has also been demonstrated (Kaplan, Metzger, & Jablecki, 1983; Keefe et al., 1981; Seymour, 1982; Stenn, Mothersill, & Brooke, 1979).

A NRS-11 seems ideally suited for the present study. It fulfills the criteria proposed by Gracely and Dunbar (cited in Price, 1988) and Price, and it also fulfills the criteria proposed by Jensen (1986) and his colleagues for the accurate measurement of pain experience: a) it is extremely easy to administer and score and can be used with a greater variety of patients than VASs; b) it has

acceptable rates of correct responding; c) it offers an adequate number of category scaling (11 points); d) and it has shown excellent sensitivity to detect treatment effects. In addition, and indispensable in this study, the NRS-11 can be administered in verbal form (Jensen & Karoly, 1992; Jensen, Karoly, & Braver, 1986), thus obviating any difficulty that hand surgery patients may have with using writing instruments.

Pain Affect

Pain affect itself is multidimensional. Because of its complexity, it is likely that only a limited set of dimensions is being tapped by available scales (Jensen & Karoly, 1992).

McGill Pain Questionnaire (MPQ). The Affective subscale of the MPQ (Melzac, 1975) is the most widely used measure of pain affect (Melzac & Katz, 1992) but some studies have placed doubt on its ability to accurately discriminate between the sensory, affective, and evaluative dimensions of pain (Turk, Rudy, & Salovey, 1985). The MPQ consists of intensity-graded scales of word descriptors categorized into four major factors: sensory, affective, evaluative, and miscellaneous. The MPQ yields three major indices: a) a pain rating index (PRI) based on the rank values of words which can be computed for each of the four major factors and also as a total score by summing the totals for each factor; b) the number of words chosen; and c) the Present Pain Intensity (PPI), which is recorded as a number from 1 to 5, each number being associated with an evaluative descriptor. The PPI is the number-word combination chosen as the indicator of overall pain intensity at the time of administration (Melzac & Katz, 1992). According to Melzac and Torgerson (1971), these numbers represent equal scale intervals.

However, the PRI scales of the MPQ produce ranked scores and thus the data should be analyzed using nonparametric statistics; this is oftentimes ignored in pain research (Reading, 1989). Some researchers have proposed transforming the data into a ratio or fraction by dividing post-session ratings by the sum of the pre- and post-session ratings (Hartman & Ainsworth, cited in Melzac & Katz, 1992); Melzac et al. (1985) also developed a simple technique to convert rank values to weighted rank values which they claim provides enhanced sensitivity in some statistical analyses.

According to its authors, the MPQ allows the patient to discriminate between different aspects of pain; it is sensitive to the effects of pain control interventions and permits the systematic examination of their relative impact on the sensory and affective components of the pain experience (Melzac et al., 1981; Melzac & Perry, 1975). However, there is considerable debate over the separation of the affective and evaluative dimensions (Melzac & Katz, 1992), and although different pain syndromes have been shown to vary systematically on the instruments' dimensions (Melzac, 1975), Turk, Rudy, and Solovey (1985) found high intercorrelations among the three factors that the MPQ purports to measure, thus casting doubt on the validity of the above claims.

Summary

The measurement of acute pain must include the assessment of both the affect and intensity dimensions; the current trend in the measurement of pain dimensions in research circles is towards using magnitude rating scales such as the previously discussed VRS, VAS, and NRS because they produce ratio data, are easy to administer and more convenient to score, and have been shown to have similar psychometric properties regardless of the pain dimension being measured (Reading, 1989). Of the available instruments, the NRS-11 seems to be the best choice for this study given the need for multidimensional measures, the psychometric properties of the scale, its ease of administration, and the potential physical limitations of the participants in this study.

Hypnosis and the Control of Acute Pain

Although acute pain is generally treated by medical means such as drugs and immobility, there is growing recognition that attention to psychological factors can result in marked decreases in pain perception (Benedetti & Murphy, 1985). Some of the current psychological approaches are cognitive-behavioral methods, relaxation techniques, provision of preparatory information to promote coping, and hypnosis (Benedetti & Murphy; Tan, 1982). The first three approaches can be classified into two basic types: preventative interventions, generally designed to decrease pain and anxiety through the use of cognitive strategies to promote coping, and combined cognitive-behavioral interventions that include a behavioral component which produces immediate physical relaxation

(Maurer, 1991). Medical hypnotic methods have the potential for using both the preventative and immediate interventions. Clarke and Jackson (1983) and Turk, Meichenbaum and Genest (1983) classify hypnotic interventions as cognitive-behavioral techniques that utilize focused attention, deep relaxation, imagery, and suggestion. The medical uses of hypnosis will be discussed in the following section.

Medical Hypnosis

Medical hypnosis refers to the use of hypnotic techniques known to enhance suggestibility in order to facilitate medical treatment. Hypnosis is now viewed as a valuable tool in medical practice (Boyne, 1982; Zahourek, 1990). Hypnosis is widely used in various areas of clinical medicine and dentistry (i.e., surgery, obstetrics and gynecology, painful medical procedures, dermatology, cardiology, pediatrics) and it is an accepted adjunct to treatment for pain control, burns, certain habit disorders, symptom reduction, and other medical problems such as asthma, gastrointestinal disorders, and other stress-related diseases (Brown, 1992; Manusov, 1990; Orne & Dinges, 1989; Sunnen, 1988; Turk, Meichenbaum, & Genest, 1983).

Hypnosis has been an effective therapeutic tool for centuries but its clinical applications had not been systematically studied until the last three decades. Acceptance by the scientific medical community had been limited in the past because the applications of hypnosis had not been rooted in sound scientific theory. This has changed in recent years, as researchers and clinicians have introduced theories that are both acceptable and supported by scientific evidence (Brown, 1992: Manusov, 1990).

Hypnosis Theory

Current theories of hypnosis can be classified into two distinct (and warring) camps: state theories and social-psychological theories. State theorists view hypnosis as a naturally occurring phenomenon that produces an altered state of consciousness with shifts in perceptual and conceptual processing and memory functions (Barber, 1991; Spiegel & Spiegel, 1978).

The mechanisms for hypnotic phenomena are not well understood. Among the paradigms that have been proposed by state theorists are: a) a dissociated state (hidden observer) posited by Hilgard (1982); b) an access to the unconscious proposed by Erickson (1952/1980); and/or c) a state of enhanced suggestibility resulting from relaxation, which has been recently proposed by Edmonston (1991). Social-psychological theorists, on the other hand, believe that hypnosis is a conscious, voluntary, compliant response to suggestion or social cues (Sarbin, 1950; Spanos & Chaves, 1989; T. X. Barber, 1969).

Regardless of the theory used to explain hypnotic phenomena, one commonality stands out: The production of hypnotic responses is contingent on heightened suggestibility (Crasilneck & Hall, 1975) which may be facilitated by mental relaxation (Edmonston, 1991), focused attention and concentration (Hilgard & Hilgard, 1983; Orne & Dinges, 1989; Spiegel & Spiegel, 1978), or contextual cues and social desirability (Spanos & Chaves, 1989). Next, we will examine the different techniques used to enhance suggestibility in clinical acute pain situations.

Control of Acute Pain Using Hypnosis

The degree to which a person responds to hypnotic suggestion is, according to some experts, related to the person's level of hypnotizability (Hilgard, 1986; Hilgard & Hilgard, 1983). However, others (Barber, 1977, 1982; Erickson, 1952/1980) argue that patients in acute states of pain are not only intrinsically motivated to reduce pain (which maximizes suggestibility) but also have the expectation that "the doctor" will help them, and are more willing to follow the clinician's suggestions uncritically, regardless of the patient's level of hypnotizability. Support for this view can be found in the work of Spanos et al. (1984, 1987, 1989) which indicates that the ability to control pain is not mediated by hypnotizability but by the contextual variables present, and by the (experimental) subject's expectations regarding his or her ability to control pain.

Hypnotic techniques used with medical patients for the control of acute pain can be categorized into five groups: a) anesthesia techniques, which render a body area insensitive to pain through suggestions of numbness; b) direct diminution of sensory pain, which consists of suggestions

focused on the reduction of pain intensity; c) sensory substitution (i.e., reinterpretation of pain sensations), where a sensation of acute pain is substituted by another sensation, not necessarily pleasant, such as tingling or coldness; e) displacement of the pain to another body area; and f) dissociation from the pain, so that the pain is still perceived but without the suffering or affective component (Barber, 1982; Erickson, 1952/1980).

Usually, but not always, the hypnotic technique is accompanied by what Spiegel and Spiegel (1978) call a ceremonial (formal) induction. An induction is merely a transition between where the patient is and the state of greater receptivity where suggestions are accepted more easily (Zilbergeld, 1986).

There are many hypnotic inductions reported in the literature. The most commonly used include eye fixation, hand levitation, imagery or story-telling, non-verbal communication, and relaxation (Crasilneck & Hall, 1975). Ericksonian inductions also incorporate metaphor and double-binds (Erickson, Rossi, & Rossi, 1976).

Research shows that the use of a hypnotic induction facilitates analgesic suggestions in acute pain trials (Fricton & Roth, 1985; Malone, Kurtz, & Strube, 1989). Suggestions may be delivered in a direct, authoritarian fashion (e.g., "your arm is getting heavier...") or by indirect means such as metaphor, non-verbal communication, and permissive instructions (e.g., "I don't know which arm will start to feel heavier first...").

Rapid Induction Analgesia (RIA) Technique. Barber (1977) developed the RIA technique using extremely permissive and indirect suggestions. The RIA was designed specifically for use in acute situations and is intended to produce analgesia in a short period of time "even in subjects previously unresponsive to hypnosis" (Barber, 1982, p. 177). In order to increase the effectiveness of hypnotic suggestion, it purposely utilizes permissive language (implying that control rests with the subject), double-bind communication, and symbolic language. It also includes suggestive verbalizations for relaxation, eye closure, imagery, suggestions for present and lasting comfort, and post-hypnotic suggestions for comfort to be activated by specific situations or persons during

upcoming painful procedures. Post-hypnotic suggestions consist of suggestions given while in hypnosis, to be carried out by the subject at a later time without the need for a formal induction.

The RIA has had both experimental (Fricton & Roth, 1985) and clinical (Barber & Mayer, 1977) success. In a series of clinical trials, several investigators found support for the utility of the RIA in clinical samples regardless of patients' level of hypnotizability (Barber, 1977; Mayer, Price, Barber, & Raffi, 1976). In his 1977 study, Barber reported that 99 out of 100 dental patients were able to undergo different dental surgical procedures without chemical anesthesia and without experiencing any discomfort. The results on replication have been generally favorable, although not as dramatic as those reported for the original study.

Gillett and Coe (1984), for example, also using a dental sample, found that about 50 percent of their subjects were able to complete the procedure without requesting chemical anesthesia after receiving the RIA intervention. The difference in results can be explained by the fact that while Barber gave continuous suggestions for analgesia throughout the dental procedure, Gillett and Coe used only one administration prior to the procedure (Price & Barber, 1987). Fricton and Roth (1985) also found the RIA more effective in reducing pain perception than a direct approach, but theirs was an experimental study using a small (n=20) volunteer sample. In a 1989 experimental study, DeBenedittis, Panerai, and Villamira used an adaptation of the RIA for the induction of their hypnosis group, and compared measures of pain affect, pain intensity, and anxiety with a control group. The results confirmed significant differences between the two groups for pain intensity and affect but not for anxiety. This indicates a) that the RIA was effective in reducing both dimensions of pain perception, and b) that pain affect and anxiety tap different affective elements. The RIA has also been used successfully in burn wards and pain and arthritis clinics (Barber, 1982).

In direct contrast, Van Gorp, Meyer, and Dunbar (1985) who also compared RIA to a conventional induction with analgesic suggestion in an experimental study, found no analgesic effects for RIA but significant effects for the conventional hypnotic intervention. At least three other studies have assessed the effects of direct versus indirect suggestion with mixed results:

Alman and Carney (1980) and Mathews, Bennett, Bean, and Gallagher (1985) found greater responsivity to indirect, permissive suggestions but Lynn, Neufeld, and Matyi (1987) found the opposite. The issue of which type of induction works best for hypnotic analgesia thus remains unresolved.

Hypnoanalgesia and pain dimensions

A related issue in hypnotic pain relief research involves the differential impact of hypnosis on the separate dimensions of pain perception. Current pain theories, as previously discussed, posit that there are two dimensions of pain involved in patients' reports of pain experience: perceived pain intensity and perceived pain affect (Melzac & Casey, 1968). Clark, Carroll, Yang, and Janal (1986) found that in both experimental thermal pain and cancer pain, subjects consistently used these two dimensions in rating their level of pain. Gracely (1979) demonstrated differential responsiveness of pain intensity and pain affect produced by noxious electrical stimulation to two different pharmacological interventions: Fentanyl (a narcotic) reduced the intensity but not the unpleasantness of perceived pain, while diazepam (an anti-anxiety agent) reduced the unpleasantness but not the intensity of perceived pain.

Although the concept of pain as multidimensional is hardly new (Melzac & Casey, 1968), it is only within the past few years that hypnoanalgesia researchers have started to include separate measures for pain dimensions in their studies (DeBenedittis, Panerai, & Villamira, 1989; Malone, Kurtz, & Strube, 1989; Price & Barber, 1987; Spiegel & Bloom, 1983; Wall & Womack, 1989). Of these studies, only the last two involved clinical samples.

Spiegel and Bloom (1983) measured pain sensation, suffering, frequency, and duration in a randomly assigned sample of 54 women with metastatic carcinoma of the breast. The women were assigned to group psychotherapy with or without adjunctive self-hypnosis training, or to standard treatment control group for a year. Both treatment conditions resulted in significantly lower ratings of pain sensation and pain suffering, and the self-hypnosis group had considerably lower scores on pain sensation than the other two groups; the self-hypnosis group showed no increases in pain measures during the year while the other groups did.

Wall and Womack (1989) compared hypnosis to a cognitive intervention involving the provision of procedural information in 20 oncology patients ranging in age from 5 to 18 years. Both techniques were effective in reducing pain measures but not anticipatory anxiety.

In the experimental realm, the already mentioned 1989 study by DeBenedittis, Panerai, and Villamira examined the effects of hypnotically induced analgesia on ischemic pain (experimentally-induced ischemic pain is thought to be similar to clinical pain, and like post-operative pain, is sensitive to morphine). Twenty-one subjects were administered the ischemic pain trials in both waking and hypnotic conditions. The hypnotic condition used a modification of Barber's (1977) RIA. Dependent variables included sensory and affective pain tolerance measures, anxiety, and two biochemical correlates of pain states (i.e., plasma concentrations of beta-endorphin and adrenocorticotropic hormone (ACTH)). Results confirmed significant increases in tolerance for pain intensity and distress during hypnosis as compared to the waking state. Hypnotic analgesia was unrelated to anxiety reduction and was not mediated either by endorphins or ACTH.

The RIA, as previously explained, uses indirect suggestions for comfort and relaxation. Relaxation and increased comfort suggestions used in experimental pain trials have had demonstrated effects on the motivational-affective dimension of pain (DeBenedittis, Panerai, & Villamira, 1989; Malone, Kurtz, & Strube, 1989). Hypnotic relaxation has been associated with significant reduction of pain affect in experimental studies (Malone, Kurtz, & Strube, 1989; Spanos, Perlini, & Robertson, 1989). It is possible that the pain dimension most impacted by the RIA is the motivational-affective and that the lack of consistent findings regarding its effectiveness is the result of undifferentiated measurement of the pain experience.

If this is true, an intervention using a modified RIA with additional emphasis on relaxation and comfort should result in a differential impact on pain affect and pain intensity, and perhaps even mediate anxiety. These are some of the hypotheses proposed in this study.

In keeping with this idea, the modifications to the RIA included repeated suggestions worded specifically to evoke comfort and relaxation, and suggestions for enhanced healing and

cooperation with medical staff. The use of hypnotic suggestions in post-surgical recovery and rehabilitation will be discussed next.

Hypnosis and Post-surgical Recovery

Medical hypnosis has also been found to have utility in the enhancement of post-surgical healing (Blankfield, 1991; Hall, 1986; Wadden & Anderton, 1982). Blankfield reviewed 18 clinical studies which employed interventions using hypnosis, suggestion, or relaxation to facilitate post-surgical recovery. Two studies failed to find any positive outcomes attributable to the interventions, but the other 16 documented improvements related to the interventions in either the physical or the emotional recovery of patients. Blankfield reports that suggestion and relaxation can shorten the post-operative period, promote physical recovery, and enhance the emotional response of post-surgical patients. He concludes that "there is a largely unexplored role for hypnosis in surgery patients that has potentially larger applications" (p.173). This role involves using hypnosis as an adjuvant to chemoanesthesia in order to not only provide anesthesia but also to facilitate the total recovery of patients following surgery.

Of the 16 studies with positive results, four included orthopedic surgeries either exclusively (two studies) or as part of other types of surgery. And of these four, two reported using medical hypnosis (Bartlett, 1966 and Bonilla, Quigley, and Bowers, 1961). In a non-randomized, non-blinded design (n=100) using a variety of surgical procedures including lumbar disc excision and open reduction of leg fractures, Bartlett (1966) found that hypnotic techniques (hypnosis, hypnotic suggestions, and drugs with suggestions by the anesthetist) had a significant impact on complaints of pain; use of pain medication; speed of recovery of normal eating, flatulence, and bowel movements; earlier ambulation; and absence of complications. The treatments were administered pre-, intra-, and post-operatively.

In a study with weak design (non-randomized, non-blinded, non-placebo-control), Bonilla, Quigley, and Bowers (1961) looked at the effects of hypnosis by the surgeon versus no intervention pre- and post- operatively in a purely orthopedic sample (arthrotomy of the knee). Nine patients

received posthypnotic suggestions that they would not fear the operation, that they would feel the post-operative pain but the pain would not bother them, and that they would be able to exercise the operated knee immediately upon surgery without discomfort; forty patients were controls. Pain medication was significantly less for the treatment group, and the average length of rehabilitation for the control group was 46 days versus 27 days for the treatment group.

Only one (Surman, Hackett, Silverberg, & Behrendt, 1974) of the studies with non-significant results involved hypnosis. Forty elective mitral valve surgery patients were used. The surgeons, but not the patients, were blinded to the intervention. Half of the group of patients saw a psychiatrist one or more times for the purpose of learning self-hypnosis; hand levitation and progressive relaxation served as the induction and suggestions were made to lessen post-surgical discomfort by using measured breathing, and pleasant images for distraction. The dependent measures were delirium, anxiety, depression, pain, and pain medication.

Although the treatment group showed trends toward shorter hospital stay, shorter intubation time, and shorter surgical intensive care unit time, there were no significant differences between the groups. It is possible that the number of visits ("one or more") was insufficient to produce optimum results. An alternative explanation for the lack of significance might be that in emphasizing self-hypnosis, the psychiatrist may not have provided adequate post-hypnosis suggestions, or that the wording of the suggestions was not appropriate. Because the authors do not provide the text used for the self-hypnosis treatment, these questions cannot be answered. Additionally, the study measured pain as a global construct and patients may have reported mixed dimensions of their pain experience at different times. This would tend to obscure potential differential effects of the treatment, which being relaxation- and imagery-based, may have had an impact on the affective dimension but not the intensity dimension of pain.

This study is a very good example of how far hypnoanalgesia research has come in the last 20 years. Today we have the ability to design studies which can answer all the questions presented here.

Although all of the studies described in this section suffer from flawed methodology, their findings hold promise that adjunctive hypnotic interventions can be of help in the enhancement of orthopedic surgical recovery. The present study incorporated suggestions for speedier recovery, early limb mobilization, normalization of body functions, and comfort.

Hypnosis and Rehabilitation

Although the literature on the uses of hypnosis in physical rehabilitation is quite limited, this treatment modality has been reported to help patients master skills, increase their sense of self-efficacy and self-esteem, and to facilitate and accelerate the rehabilitation program (Allen, 1983; Appel, 1990). Aside from the Bonilla et al. (1961) study described in the previous section, there are no other studies using hypnosis in the rehabilitation of orthopedic surgery; however, Allen (1983) and Appel (1990) reported several successes when hypnosis was used as an adjunctive treatment in the rehabilitation of neuromuscular disorders, brain-damaged patients, and cerebral vascular accidents (CVA).

Allen (1983) studied the effects of hypnotherapy on a sample of 20 CVA patients; he looked at patients' progress in the areas of physical, occupational, respiratory, and speech therapies, and examined measures of patient motivation. Daily hypnotherapy was provided to the experimental group for 60 days; the control group received standard medical treatment. Significant treatment effects were documented in all areas, indicating the utility of hypnosis interventions in the rehabilitation of physically impaired patients. There are no reported studies documenting negative results of hypnosis in rehabilitation.

Appel (1990) argues that one of the primary roles of the psychologist in a rehabilitation setting is to facilitate patient and staff interactions towards the accomplishment of the treatment goals. In orthopedic rehabilitation, the OT must encourage and motivate the patient to push through the pain of the exercise regimen (L. Gillenson, personal communication, 1993). Medical hypnosis might have utility in increasing the level of patient cooperation with treatment by using a series

of suggestions for adherence, and emphasizing the fact that the exercises are in reality a path to faster recovery (Parry, 1991).

The present study included imagery and suggestions for enhancing patient cooperation and motivation, as well as expectancies for a successful outcome. Patients were asked to imagine themselves performing the OT exercises comfortably and successfully, and to anticipate the time when their hand would be healed and as functional as possible.

Orthopedic Hand Surgery: Rehabilitation and Adherence

The hand is our primary interface with the world and one of the most commonly injured parts of the body (Gaul, 1987). It is involved in at least 15 percent of all trauma seen in emergency departments in the United States (Frazier, 1978).

Pulvertaft (1992) points out that the psychological impact of hand injuries is significant because mutilating injury or disease of the hand often elicits intense fears of disfigurement and/or loss of skills or employability. These fears may augment the hand surgery patient's levels of anxiety and perceived pain.

According to the Health Belief Model (Becker, 1974; Rosenstock, 1974), adherence to medical treatment is mediated by several factors. Among the negatively correlated factors are the duration and perceived costs of the treatment (Karoly, 1985). Fear of pain has been found to be associated with non-adherence to certain painful procedures (Fuerstein, Labbe, & Kuczmierczyk, 1986) and orthopedic hand surgery rehabilitation is acutely painful for most patients. In addition, hand surgery rehabilitation may take up to two months of daily exercise (Ouellette, personal communication, 1992).

Pain is viewed as a deterrent in the rehabilitation process because it: a) may prevent some of the physical activities necessary for progress; b) can lead to insomnia with resulting fatigue which impedes progress; c) can lead to interpersonal problems with the staff and fellow patients; e) can lead to somatic preoccupation and withdrawal from rehabilitation program participation; and f) may bring sources of secondary gain (Grzesiak, 1991).

The immediate pain, fear, and anxiety associated with recovery and rehabilitation may be perceived by some patients as too "costly," leading to less than full involvement, skipped exercises, increased use of analgesics, and/or premature termination of the regimen. Pharmacological treatment of pain may cause nausea, intestinal suppression, and dependence. A psychological intervention designed specifically to reduce pain and distress levels, and to increase patient cooperation and sense of comfort while performing OT exercises might be of benefit by enhancing recovery and increasing adherence to the medical treatment.

Psychological interventions in the control of acute pain are becoming more prevalent in certain medical specialties, but orthopedics has been largely ignored by behavioral medicine. Only one study (Achterberg, Kenner, & Casey, 1989) looking at psychological methods for the management of orthopedic pain associated with bone fractures was found within the scope of this literature review. This search failed to yield any articles dealing with the use of psychological interventions in the post-surgical recovery and rehabilitation of hand surgery patients.

The Achterberg, Kenner, and Casey (1989) study looked at the efficacy of EMG-biofeedback-assisted relaxation and audiotaped relaxation training on measures of pain and anxiety in a sample composed of mixed types of fractures. The authors compared the two experimental groups to an attention-only and to a monitor-control group. At least six sessions of the experimental treatments were administered. No changes were observed for the control or attention groups but the EMG-biofeedback-assisted relaxation and audiotaped relaxation training groups reported roughly equal and significant differences on measures of peripheral temperature, systolic blood pressure, subjective units of discomfort (SUDs) and state anxiety. There was a trend towards significance in decreased use of sleep medication but not pain medication. No differences were found on EMG recordings or measures of heart rate.

Although the Achterberg et al. (1989) study failed to take advantage of current pain theory by not taking into account the different pain dimensions, the results of their two

interventions for pain reduction were significant, and thus they opened the door to additional, badly needed research in the area of orthopedic pain management and rehabilitation.

The Present Study

Statement of the Problem

The management of injuries to bone and soft tissues following orthopedic trauma accounts for an increasing proportion of the medical workload in this country, and inadequate management of acute pain after orthopedic trauma can cause significant morbidity (Yates & Smith, 1989) and premature termination of treatment. Non-compliant patients pay a high price not only in terms of psychological suffering because of loss of hand function and disfigurement, but also in terms of their inability to earn a living, to care for themselves, and to tend to their families.

The costs to society are also high because of the loss of human resources, the overburdened medical facilities and personnel, and the increased economic and tax burdens caused by those impaired patients who become dependent on private or governmental disability programs. It has been estimated that $3.08 billion was spent in 1980 for direct treatment costs of upper extremity disorders in the United States alone, and that indirect costs such as lost earnings and compensation amounted to another $7.03 billion (Burke, Dias, Lunn, & Bradley, 1991).

This dissertation is the first study to focus specifically on orthopedic hand surgery patients and the need for adjunctive, non-pharmacological management of acute orthopedic pain. The study examines the effects that indirect hypnotic suggestions for relaxation and comfort may have on the motivational-affective (perceived pain affect) and the sensory-discriminative (perceived pain intensity) dimensions of pain. In addition, this research explores the relationships between the hypnotic intervention and several measures of post-surgical recovery and rehabilitation.

Research Questions and Hypotheses

According to the review of the literature, pain perception, post-surgical recovery, and medical rehabilitation and adherence can be manipulated through the use of hypnotic interventions. Furthermore, indirect post-hypnotic suggestions for comfort are believed to be effective in reducing

pain during future noxious medical procedures (Barber, 1991) and to have differential effects on the sensory-discriminative (pain intensity - PPI) and motivational-affective (pain affect - PPA) dimensions of pain posited by the Gate Control Theory of Melzac and Wall (1965). Based on the review of the literature on pain and hypnosis, this study proposed to answer the research questions and test the experimental hypotheses described in the following sections.

Variable Definitions

The major independent variables were treatment condition (hypnosis versus usual treatment), ethnicity and gender. The following is a listing of the dependent variables and the instruments used to measure them:

1. Perceived pain intensity (PPI). Repeated NRS-11-PPI. Larger numbers mean more pain intensity.

2. Perceived pain affect (PPA). Repeated NRS-11-PPA. Larger numbers mean more suffering.

3. State anxiety (SANX). Repeated S-anxiety (STAI). Larger numbers mean higher s-anxiety.

4. Depth of relaxation (TART). Repeated TART. Higher numbers mean increased perceived relaxation.

5. Cooperation with Occupational Therapy (OT) regimen (COOP1, COOP2). Seven-point Likert scale filled in by occupational therapist. Higher numbers mean more cooperation.

6. Surgeons' ratings of treatment progress during hospitalization (PROGRES1, PROGRES2). Seven-point Likert scale. Higher numbers mean better progress.

7. Number of doses of analgesic medication administered to patients after Day 1 through date of discharge from the hospital. This information was recorded from medical charts daily. Following Achterberg et al.'s (1989) design, medications were classified as major (high-potency medications (HAMED) such as Demerol, Compazine, Toradol), moderate (medium-potency medications (MAMED) such as Percocet, Naprosyn, Tylenol with codeine), or mild (low-potency medications (LAMED) such as Tylenol).

8. Number of days in the hospital (LS). Recorded from medical chart.

9. Trait anxiety scores (TANX). T-anxiety from STAI.

10. Number of post-surgical complications (COMPLIC) during hospitalization. Recorded by experimenter as they were reported by surgeons during rounds.

11. Patients' Perceived Comfort during OT (PCOMF1, PCOMF2). NRS-11 for Perceived Comfort. Higher numbers mean more comfort.

12. Observed Comfort during OT (OCOMF1, OCOMF2). Rated by occupational therapists (Ots) using the NRS-11 for Observed Comfort. Higher numbers mean more comfort.

Question 1a

Will the hypnosis intervention result in significant reductions in post-operative pain (PPI), suffering (PPA), and anxiety (SANX) for orthopedic hand surgery patients?

Question 1b

Will indirect suggestions for comfort and relaxation have a differential impact on the sensory-discriminative and motivational-affective dimensions of pain, and thus result in significant differences between PPI and PPA scores for the hypnosis group?

Hypotheses 1a, 1b, 1c, 1d and 1e

These hypotheses test the effect of suggestions for comfort and relaxation on measures of PPI, PPA, and SANX.

Hypothesis 1a. The experimental group will have lower post-treatment mean scores on measures of perceived pain intensity (PPI) than the control group.

Hypothesis 1b. The experimental group will have lower post-treatment mean scores on measures of perceived pain affect (PPA) than the control group.

Hypothesis 1c. The experimental group will have lower post-treatment mean scores on measures of state anxiety (SANX) than the control group.

Hypothesis 1d. Within the experimental group, post-treatment mean scores on PPA will be significantly lower than post-treatment mean scores on PPI. This hypothesis tests Barber's belief that hypnosis has a greater impact on pain affect.

Hypothesis 1e. Patients in the experimental group will require less analgesic medication between their first day of treatment and their discharge from the hospital than patients in the control group.

Question 2

Will the hypnosis intervention result in better post-surgical recovery as evidenced by fewer number of complications and shorter hospitalizations for the hypnosis group?

Hypotheses 2 a b. These hypotheses test post-surgical recovery suggestions.

Hypothesis 2a. The experimental group will have fewer post-surgical complications (COMPLIC) than the control group.

Hypothesis 2b. The experimental group will have shorter lengths of stay in the hospital (LS) than the control group.

Question 3

Will post-hypnotic suggestions for adherence and cooperation result in observable differences between the groups on measures of progress and degree of cooperation?

Hypotheses 3 a b

These hypotheses test the adherence-related suggestions.

Hypothesis 3a. The experimental group will receive higher mean scores on measures of treatment progress (PROGRES1, PROGRES2) during their hospitalization than the control group.

Hypothesis 3b. The experimental group will receive higher mean scores on measures of cooperation with OT (COOP1, COOP2) during their first two sessions post-treatment than the control group.

Question 4

Will post-hypnotic suggestions for increased comfort during OT sessions result in significantly different observable and perceived ratings of comfort between the groups?

Hypotheses 4 a, b

These hypotheses test the effects of post-hypnotic suggestions for comfort during OT.

Hypothesis 4a. The hypnosis group will have higher mean scores in ratings of Observed Comfort across the intervention interval than the control group.

Hypothesis 4b. The hypnosis group will report higher mean scores in ratings of Perceived Comfort across the intervention interval than the control group.

CHAPTER III

METHODOLOGY

Subjects

The 60 participants in this study were hand surgery patients in the Hand Service Division at the University of Miami/Jackson Memorial Medical Complex who met inclusion criteria and agreed to participate. Criteria for inclusion were: being at least 18 years old and able to speak English or Spanish; demonstrating the ability to understand and complete numerical rating scales; not being under the current influence of alcohol or other controlled substances; being lucid enough to answer questions and follow directions; being free from psychosis and homicidal or suicidal ideation as determined by a screening interview. These criteria were determined by medical records and screening interview. Seventy patients were approached. Five patients declined to participate; four did not meet criteria for inclusion; and one patient in the hypnotic group refused to continue after the first day without offering an explanation.

Demographic Characteristics of the Sample. Forty-nine participants were male and 11 were female. Thirty subjects were Latino (50%), 24 were African-American (40%), and 6 were European-American (10%). Ages ranged from 18 to 61 and the average age was 34 (SD=11). The average number of years of education was 10.78 (SD=2.95). Thirty-seven participants (61.7%) were employed at least part-time at the time of their injury, 22 (36.7%) were unemployed, and 2 (1.7%) were retired. Forty subjects (66.7%) earned less than fifteen thousand dollars a year; thirteen participants (21.7%) earned between fifteen and twenty-five thousand dollars a year; and seven (11.7%) earned over twenty-five thousand dollars a year. The majority of the subjects (75%) lived with a spouse, partner, relatives, or friends; 16.7% lived alone; and 8.3% were homeless. Twenty-five participants (41.7%) were married; twenty-three (38.3%) were single; eleven (18.3%) were separated or divorced; and one (1.7%) was widowed.

All but two subjects were in the hospital because they had suffered traumatic injury to their hand(s). The two exceptions were patients who had scheduled surgeries to correct

malformations due to rheumatoid arthritis. By chance, these two patients happened to be assigned to different groups. The majority of patients had injuries caused by accidents (41.6%) and gunshot and/or knife wounds (25%). Additional causes of injury were violent crime (16.6%), human bites (10%), and domestic violence (6.6%). Thirty-six percent of the patients were suffering from infections.

All patients suffering from traumatic injuries received some type of surgical intervention upon admission to the Trauma Center. Fifty-five percent of these patients required at least one additional surgery because of the nature of their injury, because the initial procedure was unsuccessful, or because of complications.

The majority of the patients (78%) stayed in the hospital long enough to allow for collection of all measures. However, because of their type of injury, some patients did not start OT until after being discharged from the hospital, or had only one session prior to discharge and thus did not receive a rating or received only one rating on Cooperation and/or Observed Comfort. Additionally, 10 patients left the hospital earlier than scheduled and measures for Day 4 could not be collected. Two patients' data for SANX1 and SANX4 were collected but lost because of experimenter's mistake. Fortunately, missing data were relatively evenly distributed between the groups and thus there were no sharp differences between *ns*.

The two groups did not differ significantly in gender, race, age, education, trait-anxiety (TANX), or base-line measures of PPI, PPA, and state-anxiety (INPAIN, INBOTHER, and SANX1, respectively). The number of additional surgeries was also not significantly different for the two groups.

Instruments

State-Trait Anxiety Inventory (STAI). The STAI (Spielberger, Gorsuch, Lushene, Vag, & Jacobs, 1983) was developed as a measure of anxiety with a normal adult population. Anxiety is characterized as "subjective feelings of tension, apprehension, nervousness, and worry, and activation or arousal of the autonomic nervous system" (p.1). Two similar self-report

questionnaires are used: the state anxiety, or S-anxiety, asks respondents how they feel right now; it measures the present level of anxiety experienced by the individual.

The trait anxiety, or T-anxiety, asks how they generally feel; it measures relatively stable individual differences in anxiety proneness, or the degree to which people tend to perceive stressful situations as dangerous or threatening. A series of 20 statements are answered using a 4-point scale, with 1 indicating low anxiety and 4 indicating high anxiety. T-anxiety appears to be related to differences in the frequency and intensity of manifested anxiety states in the past, as well as the potential for S-anxiety experiences in the future. The higher the degree of trait anxiety, the higher the likelihood of experiencing high degrees of state anxiety in situations perceived as threatening.

The STAI has more than adequate psychometric properties, and has been used extensively in research and clinical practice. It has been used in medical research including surgery (Auerbach, 1973), heart disease (Bloom, 1979), and headaches (Andrasik & Holroyd, 1980). In addition, the STAI S-anxiety appears to be sensitive to changes in anxiety levels in response to stressful situations and to stress-reduction interventions (Nemann, 1988). Internal consistency for the S-anxiety scale is good (Cronbach alpha coefficients range from .86 to .95 with a median coefficient of .93). Test-retest reliability is relatively low (range .16 to .62 with median reliability coefficient of only .33), reflecting the fluctuations in state anxiety and thus are an indication of the sensitivity of the instrument to detect different situational factors at the time of testing.

The T-anxiety scale has very good reliability coefficients (Spielberger et al., 1983). Test-retest stability ranged from .73 to .86 for six subgroups of college students, and internal consistency alpha coefficients ranged from .89 to .96 for three different age groups of working adults. The T-anxiety scale also differentiated between general medical patients with and without psychiatric complications. Concurrent, convergent, and divergent validity have also been demonstrated by several studies (Spielgerber et al., 1983) using the MMPI and other established measures of trait anxiety.

In this study, STAI T-anxiety scores were used to investigate hypothesized correlations with post-operative S-anxiety. S-anxiety scores were used to detect differential changes in levels of distress over time. Due to the physical limitations of the sample in this study, the primary investigator read the statements and recorded the answers as indicated by the patient.

11-point Numerical Rating Scale. The 11-point Numerical Rating Scale (NRS-11) is a magnitude rating scale. It asks the patient to rate his or her level of perceived pain intensity (or any other characteristic, such as distress caused by the pain) on a numerical scale from zero to 10, with the zero representing one end of the continuum (e.g., "no pain") and 10 the opposite end (e.g., "pain as bad as it could be"). The number stated by the patient is the pain intensity score.

The psychometric properties of the NRS-11 were discussed in the section on pain measurement in Chapter II. The NRS-11 format was found more than adequate for the purposes of this study.

Reading (1989) recommends that patients be asked to rate different pain dimensions using separate magnitude scales because failure to emphasize the differences between the dimensions of interest may result in indiscriminate reporting (i.e., using a single scale to reflect different components of their pain experience). In this study, separate NRS-11s were used to assess participants' perceived levels of pain intensity, pain affect, and comfort.

Likert Scales. Likert scales measure the degree of agreement or disagreement with a given statement. This study used 7-point Likert scales to measure OT's observations regarding patients' cooperation with treatment (COOP) and to record surgeons' ratings of treatment progress (PROGRES1, PROGRES2).

Long Stanford Scale. The Long Stanford Scale (TART) ((Tart, 1970) is a self report, numerical rating scale that measures the depth of the subject's hypnotic trance ranging from zero (0) to ten (10). A score of 0 represents the feeling of being wide awake and fully aware of one's surroundings (not hypnotized) while a score of 10 represents a feeling of being deeply hypnotized. In this study, the subjects were asked to rate their level of relaxation rather than hypnosis, with

0 meaning not relaxed at all and 10 meaning the most relaxed you have ever felt. Instructions for rating subjects' depth of relaxation were given at the start of the hypnotic script.

Treatment

The hypnotic treatment consisted of a standardized induction incorporating relaxation and positive suggestions. The RIA (Barber, 1977, 1982) was used with modifications made to fit the present sample, context, and research questions. The relaxation and suggestion portions of the procedure were interwoven; suggestions were given for a smooth post-surgical recovery, relaxation, comfort, improved limb mobility as appropriate, and cooperation with treatment. Patients also received suggestions regarding their ability to do the OT exercises in a relaxed, comfortable manner while cooperating with the OT, and being as successful as possible in using their hand after rehabilitation. Comfort, cooperation, and relaxation were evoked through the use of post-hypnotic suggestions linked to specific cues, such as the sight of the OT, the beginning of discomfort or the start of exercising, and appropriate requests for wound care by medical personnel. Patients were asked to rate their perceived level of relaxation using the TART scale.

Procedures

In order to avoid contamination, the experimental and control groups were run consecutively, with the hypnosis group being randomly assigned to start first. The control group received the usual medical treatment for post-surgical pain (analgesic medication, usually prn) and the hypnosis group received the usual medical treatment plus the hypnosis intervention. Medical staff identified potential participants (patients who were likely to remain hospitalized for at least three days post-surgery) upon arrival to the Ryder Trauma Center Hand Service. These patients were then contacted in person by the primary investigator to explain the project, answer questions, and determine willingness to participate. Those volunteers who met inclusion criteria were accepted into the study.

Subjects were interviewed as soon as possible after admission to the Hand Service. On that day (Day One), participants were asked to rate their level of pain intensity and pain affect and

were administered both the Trait and State portions of the STAI. Participants in the hypnosis group were then administered the experimental intervention which incorporated the TART scale. If the patient was not scheduled to undergo additional surgery, the relevant suggestions were omitted from the script.

Pain and anxiety measures were recorded once a day for three additional days (Days Two, Three, and Four). The experimental intervention was delivered by the investigator on each of the three days immediately following the collection of these measures. Thus, changes in pain intensity, pain affect, and anxiety were measured at least twenty-four hours post-intervention rather than immediately after it. Immediate measuring is a more traditional protocol yielding maximum positive results from relaxation interventions. Patients who required additional surgery(ies) did not receive the intervention on the day of the surgery unless their surgery was scheduled late in the day.

Occupational therapists (Ots), nursing staff, and surgeons were blind to group assignment. Surgeons rated patients' progress twice during hospitalization. Patients' progress was assessed by the surgeons during Monday, Wednesday, and Friday rounds. Depending on type of surgery, progress was evaluated during the first two rounds following surgery or as soon as such assessment was meaningful or possible (e.g., patients with tendon repairs were evaluated several days post-surgery). The Ots were asked to rate Cooperation and Observed Comfort twice during the first week of rehabilitation. Ots, however, later reported that they had often recorded their observations as late as two or three weeks after the session had taken place because of lack of time (This will be discussed further in later sections). Patients' ratings of Perceived Comfort were obtained on the same day(s) of their OT session.

CHAPTER IV

RESULTS

This chapter presents the results of the statistical analyses performed to test the hypotheses presented in Chapter Two. This study used a mixed repeated measures design with randomized group assignment to an experimental or usual-treatment-control group. The surgeons and Ots (but not the patients or the experimenter) were blind to group assignment. The statistical analyses were done using SPSS-X 4.1 for IBM/CMS (Statistical Package for the Social Sciences Inc., 1983). Alpha level was set at .05. Directional hypotheses were tested using one-tailed levels of significance for univariate results.

Tests of Hypotheses

The results of the statistical tests performed are presented in terms of the four areas in question: a) Pain intensity (PPI), pain affect (also called suffering; PPA), and anxiety (SANX), including differential effects of hypnosis on the physical and affective dimensions of pain; b) post-surgical recovery; c) rehabilitation and adherence; and d) effectiveness of post-hypnotic suggestions for comfort during OT sessions.

Pain and Anxiety

Hypotheses 1a, 1b, 1c. The experimental group will have lower post-treatment mean scores on measures of a) PPI; b) PPA); and c) (SANX) than the control group.

A doubly-multivariate repeated measures MANOVA was performed to test for differences between the hypnosis and the control groups on the logically-grouped pain-related variables PPI, PPA, and SANX (taken together) at four different times (pre-treatment = Day 1; post-treatment = Days 2, 3, and 4). Thus, the between-groups factor was hypnosis and the within-subjects factor was time. Only cases with complete data (listwise deletion) were selected for analysis (N = 47).

The Box's M test of homogeneity of dispersion matrices was significant ($F(78,6369) = 1.29$, $p = .043$), indicating that the homogeneity of covariance matrices assumption was not tenable. However, inspection of the determinants of the covariance matrices indicated that the Hotelling's T^2

test would be conservative, as the larger determinant ($|S_c|$ = 1788270579195.3; $|S_h|$ = 27687587344.0) was associated with the larger group size (n_c = 24; n_h = 23) (Stevens, 1992).

Between-groups Effects. Following Stevens (1992) recommendation, both the multivariate and univariate tests were examined, as they sometimes offer different results. Significant multivariate between-groups effects were found for hypnosis when the three sets of variables were examined together (Hotelling's = .79, exact $F(3,43)$ = 11.30, p = .000). Significance for between-groups hypnosis effects were also revealed by the univariate results. Measures of PPA and PPI were significantly different for each group, $F(1,45)$ = 27.14, p = .000 and $F(1,45)$ = 10.67, p = .001, respectively. Between-groups effects for SANX approached significance ($F(1,45)$ = 2.465, p = .062).

Within-subjects Effects. When within-subjects effects were examined, no differences were found between the groups on Day 1 (pre-treatment) for any of the variables. On subsequent days, patients in the hypnosis group reported lower PPA and PPI than the control group for all three days post-treatment, and lower SANX than controls on Day 4. This hypnosis by day interaction was revealed by the averaged multivariate results (Hotelling's = .25, approximate $F(9,395)$ = 3.59, p = .000). Because the Mauchly sphericity test reached significance (W = .00001, approximate X^2 (44, N = 47) = 476.62, p = .000), the degrees of freedom for the averaged univariate within-treatments tests were adjusted using Greenhouse-Geisser (GG) Epsilon = .3203. As can be seen on Table 1, PPI and PPA (but not SANX) resulted in significant F-values even after adjustment.

Table 1

Adjusted Averaged Univariate F-tests for Hypnosis by Day Interaction

Variable	F	df	p	Adjusted df	tt_p
PPI	7.76	(3,135)	.000	(1,43)	<.01
PPA	7.76	(3,135)	.000	(1,43)	<.01
SANX	2.08	(3,135)	.105	N/A	

tt_p = two-tailed

Simple Effects. These tests were performed using the MWITHIN option on the WSDESIGN subcommand for repeated measures MANOVA (SPSS-X User's Guide, 3rd Ed., 1988, p.575). This option permitted the testing of differences between group means for each of the three sets of variables at each time point. As can be seen by referring to Tables 2 and 3, the means of the hypnosis group for both PPA and PPI were significantly lower than the means for the control group across all levels of time and very large effect sizes were observed for these variables (eta sq. = .21 to .36 for PPA and .17 to .28 for PPI) after the first treatment. For SANX, however, the differences in group means started to show only after the second treatment, and effect sizes increased slowly, being small on Day 2 (eta sq. = .02) and medium on Days 3 and 4 (eta sq. = .07 and .09, respectively). After the third treatment, the hypnosis group had significantly lower scores for SANX than the control group. Table 2 and figures 1 and 2 present the findings for the overall MANOVA used to test hypotheses 1a, 1b, and 1c.

Table 2

Means (and Standard Deviations) and Tests of Simple Effects for Repeated Measures of PPA, PPI, and SANX

SIMPLE EFFECTS	HYPNOSIS n = 23	CONTROL n = 24	F(df)	p
DAY 1				
PPI	7.78 (2.24)	7.04 (2.97)	.08(1,57)	.784[tt]
PPA	8.30 (2.51)	8.29 (2.27)	.24(1,56)	.625[tt]
SANX	51.30 (12.84)	51.75 (14.82)	.11(1,46)	.738[tt]
DAY 2				
PPI	3.78 (2.35)	6.08 (2.85)	12.85(1,57)	.000[t]
PPA	2.57 (3.07)	6.83 (2.99)	29.33(1,56)	.000[t]
SANX	40.57 (13.47)	44.92 (15.01)	1.44(1,46)	.118[t]
DAY 3				
PPI	3.22 (2.58)	5.54 (2.57)	8.40(1,57)	.003[t]
PPA	2.70 (2.95)	5.79 (3.22)	12.26(1,56)	.000[t]
SANX	37.17 (13.73)	45.08 (16.04)	2.54(1,46)	.059[t]
DAY 4				
PPI	3.17 (2.71)	6.42 (2.65)	14.15(1,57)	.000[t]
PPA	2.35 (2.60)	6.54 (3.09)	29.67(1,56)	.000[t]
SANX	34.85 (11.87)	44.0 (16.62)	5.77(1,46)	.010[t]

[t]p = one-tailed [tt]p = two-tailed

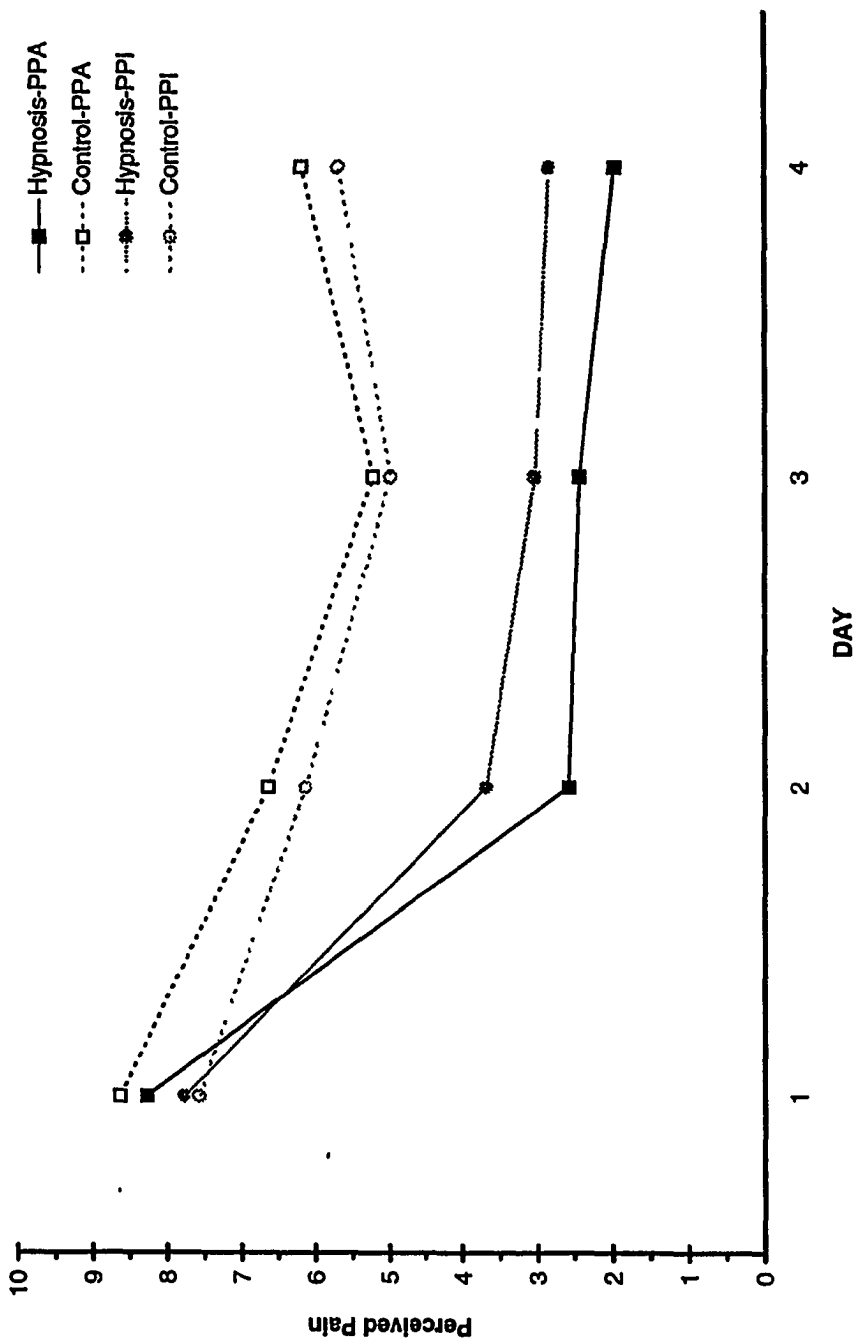

Figure 1

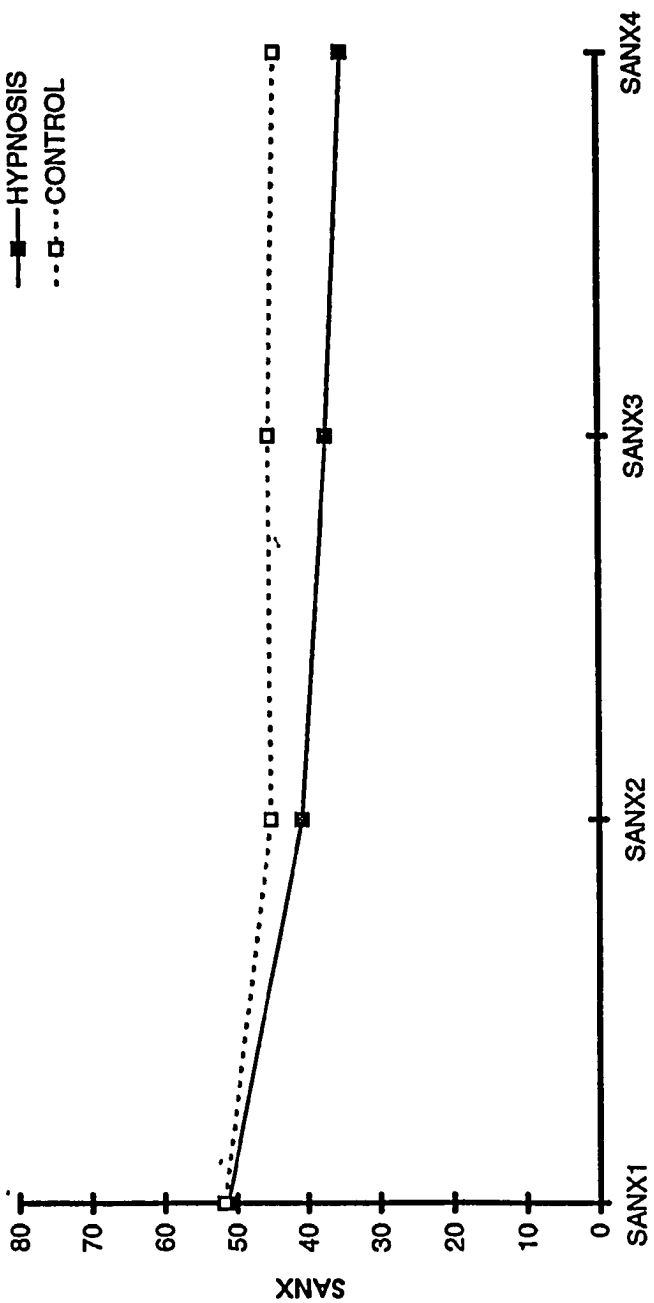

Figure 2

Adequate power for the tests was observed, as can be seen by examining Table 3. Table 3 also presents effect sizes for all the analyses performed.

Table 3

Effect Sizes and Observed Power for Pain-related MANOVAs

EFFECT	EFFECT SIZE	*POWER
Between-groups:		
Main effect for hypnosis		
Multivariate:	.44	1.0
Univariate:	Eta sq.	
PPI	.19	.89
PPA	.37	.99
SANX	.05	.34
Within subjects: Univariate		
Hypnosis by Day interaction	Eta sq.	
PPI	.15	.99
PPA	.15	.99
SANX	.04	.52

Table continues

EFFECT	EFFECT SIZE	*POWER
Multivariate Hypnosis by MWITHIN:		
DAY 2	.35	.98
DAY 3	.21	.78
DAY 4	.37	.99
Univariate Hypnosis by MWITHIN:	Eta sq.	
DAY 2		
PPI	.17	.84
PPA	.34	.99
SANX	.02	.18
DAY 3		
PPI	.17	.85
PPA	.21	.92
SANX	.07	.43
DAY 4		
PPI	.28	.98
PPA	.36	.99
SANX	.09	.56

*Power at .05 level

Hypothesis 1d. Within the experimental group, post-treatment mean scores on PPA will be significantly lower than post-treatment mean scores on PPI. This hypothesis tests Barber's belief that hypnosis has a greater impact on pain affect (suffering).

Hypnosis was found to have a greater impact on PPA (suffering) than on PPI (pain) on each day post-treatment. Table 4 presents the differences between PPI and PPA scores for the two groups

by day (see also Figure 1), along with the results of the paired t-tests used to test the differences. The Bonferroni correction was used to reduce the possibility of a Type I error; alpha level was set at .05/3 = .017.

Table 4

Post-treatment Differences Between PPI and PPA Means and Tests of Significance by Group

	N (SD)		MDIFF (SD)	t(df)	t_p
DAY 2	PPI	PPA			
$n_{hypnosis}$ = 30					
	3.67 (2.41)	2.57 (2.87)	1.10 (1.86)	3.23(29)	.002*
$n_{control}$ = 30					
	6.13 (3.00)	6.63 (3.38)	-.50 (2.19)	-1.25(29)	.111
DAY 3	PPI	PPA			
$n_{hypnosis}$ = 30					
	3.03 (2.54)	2.43 (2.79)	.60 (1.13)	2.90(29)	.004*
$n_{control}$ = 29					
	5.14 (2.75)	5.21 (3.31)	-.07 (1.96)	-.19(29)	.422
DAY 4	PPI	PPA			
$n_{hypnosis}$ = 29					
	2.83 (2.77)	1.97 (2.49)	.86 (1.89)	2.46(28)	.010*
$n_{control}$ = 30					
	5.67 (3.02)	6.17 (3.24)	-.50 (2.22)	-1.23(29)	.114

t_p = one-tailed *Significant using Bonferroni correction alpha = .05/3 = .017

In summary, as hypothesized, patients in the hypnosis group not only reported significantly greater reductions in pain and suffering (PPI and PPA) across time than controls, but also reported significantly less suffering than pain (a reversal of the pattern reported by controls) after the first treatment. While both groups reported higher levels of PPA than PPI at baseline, hypnosis subjects reversed the pattern and reported PPA scores significantly below their PPI levels post-treatment, while controls maintained the original pattern of higher PPA scores. The differences between the SANX means only reached significance on Day 4.

Correlations. Zero-order correlations were run for all variables in the study. Regarding pain and suffering, the following results were notable. Significant correlations were found between Trait anxiety (TANX) and baseline measures of PPI, PPA, and SANX (.40, p = .002; .29, p = .029; and .35, p = .008, respectively). TANX was correlated with PPI on Day 2 (.36, p = .007) and with SANX across Days 2, 3, and 4 (.49, p = .000; .46, p = .000; and .44, p = .002, respectively). The correlations of TANX with PPA approached significance on Days 2 and 3 (.26, p = .055; .26, p = .057, respectively), but no trend was noted for Day 4 (.06, p = .651).

In addition, when same-day scores for SANX, PPI, and PPA correlations were examined, SANX was found to correlate significantly with both variables, but the relationship was stronger between SANX and PPA than between SANX and PPI, as can be seen on Table 5.

Table 5

Correlations for PPI, PPA, and SANX

	SANX1	SANX2	SANX3	SANX4
INPPI	.34**			
INPPA	.43**			
PPI1		.15		
PPA1		.26*		
PPI2			.47**	
PPA2			.56**	
PPI3				.26
PPA3				.39**

Note. INPPI = Baseline PPI; INPPA = Baseline PPA; SANX1 = Baseline SANX

*p < .05 **p < .01

Race and Gender Effects. Race and gender effects were tested using MANCOVAS (with baseline scores as covariates) in order to determine whether these variables needed to be further considered. The results of multivariate and univariate between-groups and within-subjects analyses failed to show evidence of significant main effects or interactions for either of these two demographic variables.

The MANCOVA for gender effects produced a cell (Females) with a singular matrix, and thus the Box's M-test of homogeneity of the dispersion of variance/covariance matrices could not be performed. The singular matrix was the result of identical scores by females for pre-treatment PPA and SANX.

However, given that a) the MANCOVA for gender was observed to suffer from low power (.51 for multivariate test; .56 for univariate tests) due to the small number of females in the sample (n = 9); b) the univariate F-test for gender by day interaction for SANX approached significance ($F(2,89) = 2.94$, $p = .058$, two-tailed); and c) exploratory one-way ANOVAS performed on pre-treatment measures by gender had indicated that females reported significantly higher levels of PPI, PPA, and SANX on Day 1, simple effects were tested using the MWITHIN option for the repeated-measures MANOVA for gender.

As can be observed on Table 6, females reported significantly greater PPI on Days 2 and 3, but on Day 4 the scores were not significantly different from those of males. Females reported greater PPA on Day 3 but again, by Day 4 their scores were not different from those of males. Females, however, after having initially reversed the PPI/PPA pattern after Day 1 to lower PPA than PPI, appeared to exhibit a reversal, and reported higher PPA than PPI on Days 3 and 4, while males maintained the lower PPA than PPI pattern throughout. Females also reported significantly greater SANX on Day 2, but non-significant differences on Days 3 and 4.

Males' reports of SANX, after decreasing significantly after the first day, remained at about the same level across the three days post-treatment while females' reports reflected a steady decrease. By Day 4, however, there were no significant gender differences on any of the variables. This is represented graphically by Figures 3 and 4.

Impact of additional surgery. In order to clarify the role of hypnosis on pain and anxiety reduction, Chi square analyses were done to test for group differences in the number of additional surgeries performed. There were 17 surgeries performed on Day 1; 10 on Day 2; 6 on Day 3; and 3 on Day 4. There were no significant differences between the groups on any of the days.

Table 6

Means (and Standard Deviations) and F-tests of Simple Effects by Gender

DV	MALES	FEMALES	F(df)	p
DAY1	n = 49	n = 11		
PPI	7.33 (2.76)	9.18 (1.08)	4.76 (1,58)	.033[tt]
PPA	8.13 (2.49)	9.73 (.90)	4.18 (1,58)	.045[tt]
SANX	49.90(12.91)	65.0 (7.98)	13.74 (1,57)	.000[tt]
DAY2	n = 38	n = 9		
PPI	4.5 (2.78)	6.89 (2.37)	3.00 (1,44)	.045[t]
PPA	4.34 (3.54)	6.44 (4.07)	.99 (1,44)	ns
SANX	39.82(13.54)	55.3 (10.39)	7.23 (1,44)	.005[t]
DAY3	n = 38	n = 9		
PPI	3.94 (2.61)	6.33 (2.96)	3.35 (1,44)	.037[t]
PPA	3.68 (3.12)	6.78 (3.73)	4.47 (1,44)	.020[t]
SANX	39.47(13.74)	48.56(20.06)	.93 (1,44)	ns
DAY4	n = 38	n = 9		
PPI	4.71 (3.23)	5.33 (3.23)	.83 (1,44)	ns
PPA	4.21 (3.65)	5.67 (2.92)	1.73 (1,44)	ns
SANX	39.32(15.07)	40.33(16.65)	1.88 (1,44)	ns

[tt]p = two-tailed [t]p = one-tailed

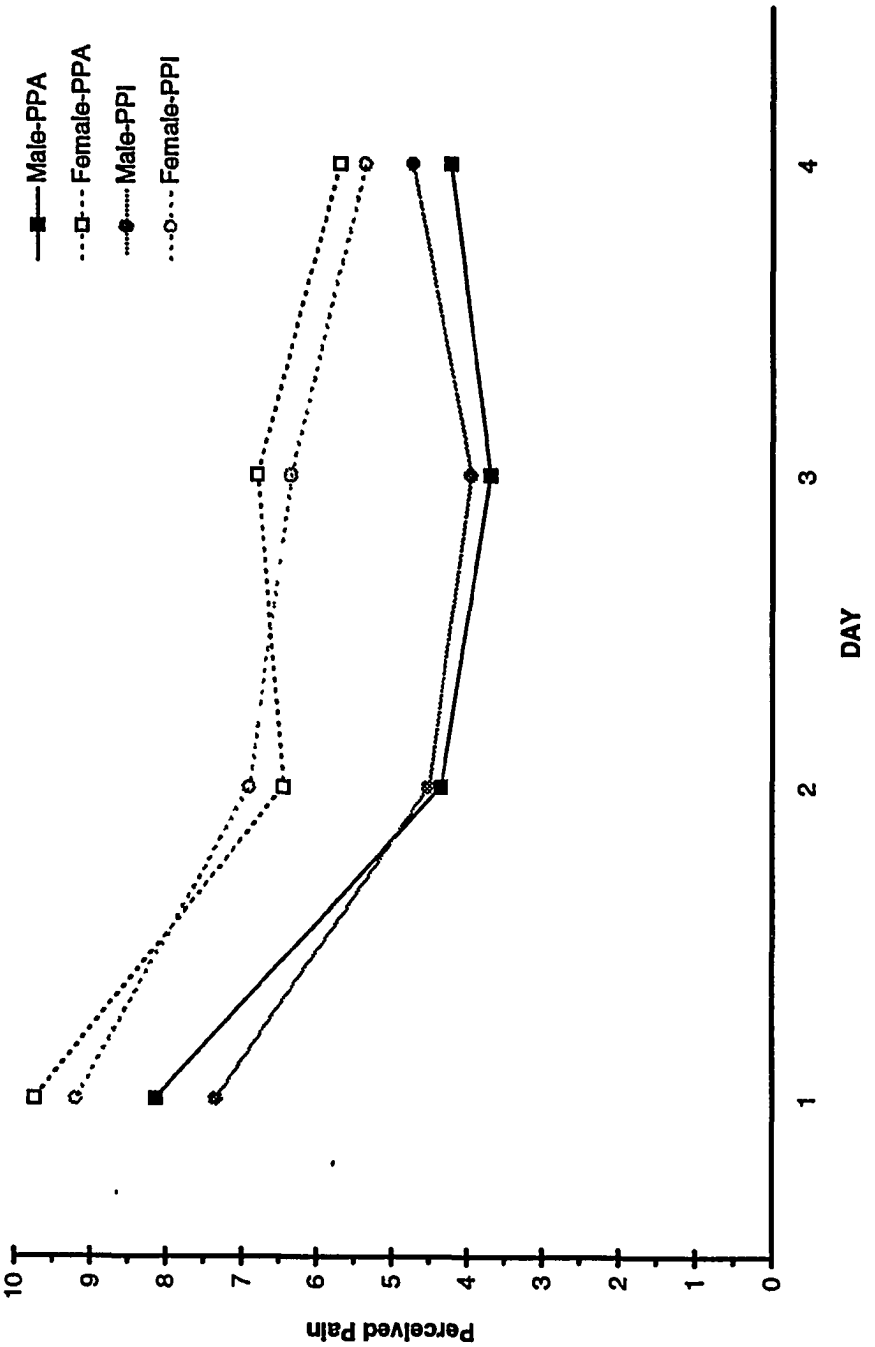

Figure 3

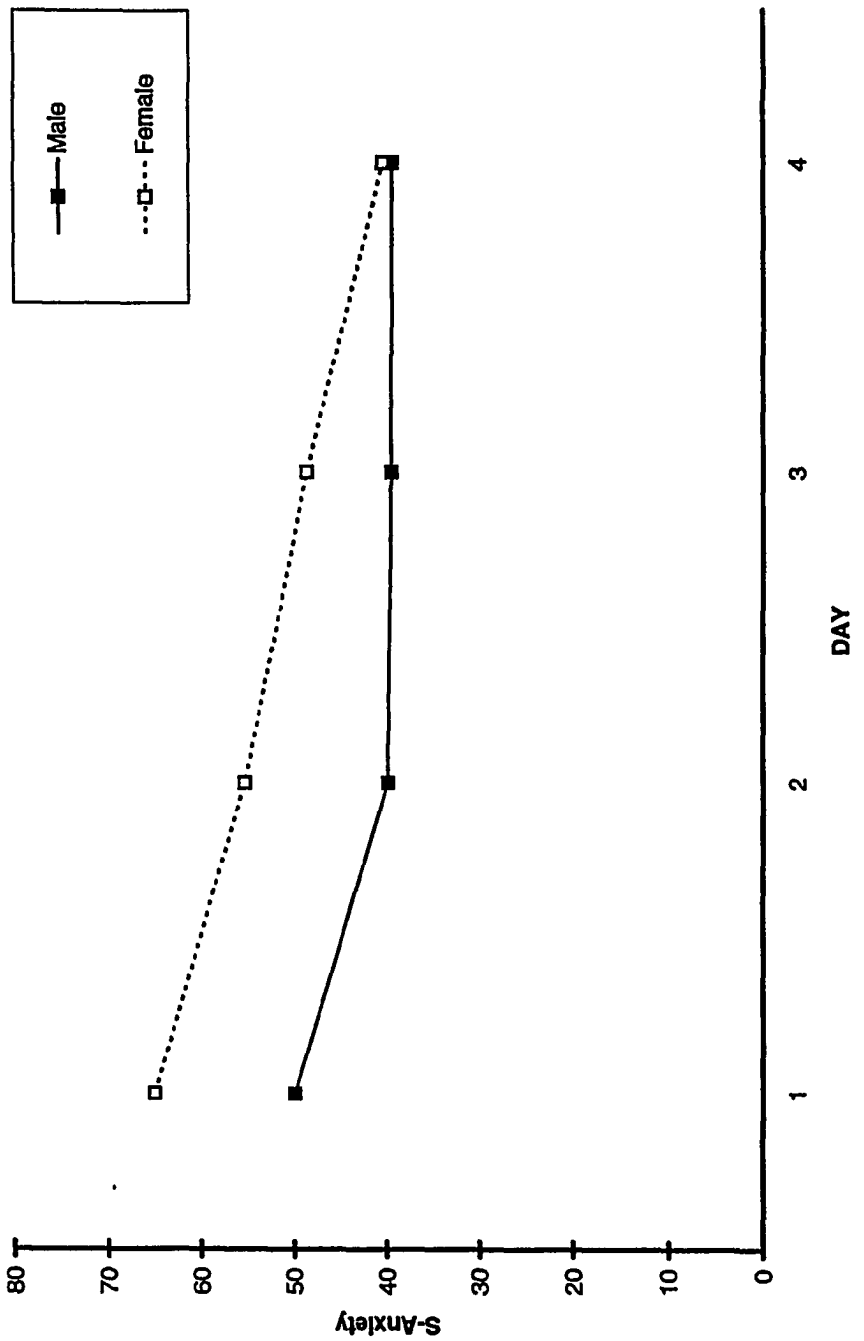

Figure 4

Examining the relative contribution of hypnosis. In order to further understand the relative contribution of hypnosis to changes in PPI, PPA, and SANX above and beyond that due to baseline differences, gender, and t-anxiety, hierarchical multiple regression analyses were carried out separately for each time-point using PPI, PPA, and SANX as the criterion variable. The predictors were the variables mentioned above, plus group membership. Baseline scores were entered first, thus creating residualized scores on the outcome variable; in the second step, gender and TANX were entered together. Group membership was entered last. Dummy-coded vectors were used to represent gender (males = 0; females = 1) and group membership (control = 0; hypnosis = 1). The change in R^2 after group membership entered the equation was tested for significance.

As can be seen on Table 7, after the contribution of baseline scores, gender, and t-anxiety was accounted for, membership in the hypnosis group still explained a significant proportion of the variance in PPA scores on Days 2, 3, and 4 (R^2 change =.36, .17, and .30, respectively); a significant proportion of the variance in PPI scores on Day 4 (R^2 change = .17); and in SANX scores on Day 4 (R^2 change = .15). All observed p values were one-tailed and were examined against Bonferroni-corrected p values = .0055.

Table 7

Tests of Significance for Changes in R^2 due to Group Membership after Controlling for Baseline Scores, Gender, and T-anx

Criteria	MultR	R^2	R^{2t}	R^2 Change	F Change	SigF Change
DAY 2						
PPI	.52	.27	.19	.11	5.89	.0099[t]
PPA	.70	.49	.44	.36	27.83	.0000[t]*
SANX	.76	.58	.54	.02	1.84	.0910[t]
DAY 3						
PPI	.55	.30	.23	.10	5.46	.0123[t]
PPA	.56	.31	.24	.17	9.61	.0018[t]*
SANX	.58	.33	.26	.04	2.51	.0605[t]
DAY 4						
PPI	.48	.23	.16	.17	9.11	.0022[t]*
PPA	.59	.35	.28	.30	17.92	.0000[t]*
SANX	.69	.47	.42	.15	11.41	.0008[t]*

[t]p for R^2 Change is one-tailed. *p = significant using Bonferroni Correction alpha = .05/9 = .0055.

As presented on Table 8, being in the hypnosis group was the only predictor of decreases in PPI and PPA on all days. Hypnosis was more strongly related to PPA (β = -.62; -.42; -.56) than to PPI (β = -.34; -.32; -.43); it was least strongly related to SANX (β = -.14, ns; -.21, ns; -.39). However, being a member of the hypnosis group was the best predictor of decreases in SANX on Day 4, followed by being female, a finding that adds information to the results obtained with the MANCOVAS reported above. Gender was not associated with any other time-points for any of the variables. Baseline ratings did not predict ratings post-treatment except in the case of SANX. SANX on Day 1

was the best predictor of increases in SANX on Days 2 and 4. TANX was significantly associated with increases in PPI on Day 3, PPA on Day 2, and SANX on Days 3 and 4.

Table 8

Beta Coefficients for Multiple Regression Analyses of PPI, PPA, and SANX

DV	DAY 2		DAY 3		DAY 4	
PPI	b	ß	b	ß	b	ß
INPPI	.24	.21	-.02	-.02	-.17	-.14
GENDER	1.44	.20	1.52	.21	.32	.04
TANX	.03	.10	.07*	.32*	.04	.16
HYP.	-1.99*	-.34*	-1.83*	-.32*	-2.67**	-.43**
PPA						
INPPA	.05	.03	.13	.09	-.09	-.06
GENDER	-.14	-.01	.83	.21	.70	.08
TANX	.10**	.35**	.03	.12	.02	.07
HYP.	-4.56**	-.62**	-2.90**	-.42**	-3.04**	-.56**
SANX						
SANX1	.67**	.64**	.34	.31	.43*	.36*
GENDER	.90	.03	-1.91	-.05	-14.80**	-.37**
TANX	.18	.16	.44*	.34*	.54**	.41**
HYP.	- 4.07	-.14	-6.36	-.21	-12.65**	-.39**

* $p < .05$ ** $p < .01$

Secondary analyses regarding the role of TART. Correlational analyses regarding the role of depth of hypnosis (TART) in relation to reductions in PPI, PPA, and SANX for the hypnosis group resulted in significant findings only for TART ratings reported on Day 3 (during third treatment) as they relate to ratings of PPI and PPA the following day. The correlation with SANX on Day 4 approached significance. The correlations on Day 4 are $r_{ppi} = -.47$, $p = .011$; $r_{ppa} = -.38$;, $p = .044$; and $r_{sanx} = -.39$, $p = .065$.

Hypothesis 1e. Patients in the experimental group will require less analgesic medication between their first day of treatment and their discharge from the hospital than patients in the control group.

Although patients in the hypnosis group received less analgesic medication over the length of their hospital stay than did controls, the differences were not significant when t-tests for independent samples were performed. Analgesics were divided according to their potency following Achterberg et al.'s (1989) model. Demerol, Compazine, and Toradol were classified as high-potency medications (HAMED); Percocet, Naprosyn, and Tylenol with codeine were classified as medium-potency (MAMED); Tylenol was classified as low-potency (LOMED). The total amount of each medication administered to each patient (from the time of the initial interview until discharge from the hospital) was translated into standard units of administration for that particular medication and the resulting standard doses were then added up for each of the two groups in the study. T-tests for independent samples were then performed on each of the three categories of analgesics (HAMED, MAMED, and LOMED).

The t-test for HAMED yielded non-significant results ($M_{control} = 2.40$, $SD = 10.26$; $M_{hypnosis} = .63$, $SD = 2.01$, $p = .181$ (one-tailed)). MAMED was also not significant, $M_{control} = 21.20$, $SD = 40.66$; $M_{hypnosis} = 14.30$, $SD = 17.55$, $p = .199$ (one-tailed). LAMED was equally non-significant, $M_{control} = 1.43$, $SD = 3.83$; $M_{hypnosis} = 1.10$, $SD = 3.11$, $p = .356$ (one-tailed). Because of the significant differences in SD between the groups for HAMED and MAMED, the separate variance estimates were used.

Summary of Results for H1a, 1b, 1c, 1d and 1e. Hypotheses 1a, 1b, and 1c, which stated that patients in the hypnosis group would have lower ratings of PPI, PPA, and SANX were supported. Hypothesis 1d, which tested Barber's contention that hypnosis effects greater impact on suffering than on pain intensity, was also supported. Hypothesis 1e, which stated that hypnotic subjects would require less analgesic medication, was not supported.

Post-surgical Recovery

Hypothesis 2a. The experimental group will have fewer post-surgical complications (COMPLIC) than the control group. This hypothesis was supported.

No post-surgical complications were experienced by patients in the hypnosis group while eight instances of complications arose in the control group. All of the patients who experienced complications were originally admitted because of infections. The following listing describes the complications noted by the surgeons during rounds: Open, red wounds that were slow to heal; decreased and/or painful range of motion, swelling, excessive bleeding, decreased sensitivity, abscesses, skin loss, joint stiffness, and osteomyelitis. Four of the eight instances of complications required additional surgery to remove pus and/or necrotic tissue, and in one instance, to remove a digit.

A Chi-square test of independence for two dichotomous variables resulted in minimum expected frequencies of 4.0 for two of the four cells in the table. Thus, Fisher's exact test was used to determine the probability of obtaining the observed results if the variables were independent. This probability was calculated to be $p = .002$, one-tailed. However, given that "Fisher's exact test is most useful when $n = 20$ or less" (SPSS-X Introductory Statistics Guide, 1988, p. 55), Yates' continuity correction (1 degree of freedom) was also examined. It resulted in a value of 7.067, $p = .008$. As demonstrated by the moderate and significant negative correlation between the variables (Spearman's correlation = -.392, $t = -3.247$, $p = .002$), it can be said that there is an inverse relationship between being a member of the hypnosis group and experiencing post-surgical complications. Further evidence of the dependence between the variables was obtained by

the ϕ coefficient (ϕ (1, N= 60) = .392, p = .002) which resulted in an approximate value of .15 for the shared variance between group membership and complications.

Hypothesis 2b. The experimental group will have shorter lengths of stay in the hospital (LS) than the control group. Patients in the hypnosis group did not have significantly shorter hospitalizations than patients in the control group. A t-test for independent samples revealed no significant differences between the groups ($M_{control}$ = 7.23, SD = 5.26, n = 30; $M_{hypnosis}$ = 6.57, SD = 3.80, n = 30; t = .56, p = .288).

Rehabilitation and Adherence

Hypothesis 3a. The experimental group will receive higher mean scores on measures of treatment progress (PROGRES1, PROGRES2) during their hospitalization than the control group.

Hypothesis 3b. The experimental group will receive higher mean scores on measures of cooperation with OT (COOP1, COOP2) during their first two sessions post-treatment than the control group.

Patients in the hypnosis group were rated by their surgeons as making significantly better progress after surgery than patients in the control group, but were not judged by the Ots to be significantly more cooperative than controls. There were no significant race or gender differences found for either of the adherence-related variables. The correlation of TART scores and measures of cooperation did not reach significance. The correlation of TART with measures of progress was significant, r = .40, p = .04. COOP2 was significantly and inversely related to PPI ratings each day post-treatment (r_{day2} = -.27, p = .041; r_{day3} = -.26, p = .048; r_{day4} = -.29, p = .038); and PPA on Day 2, r = -.29, p = .031 (with a trend on Day 4, r = -.24, p = .073).

A repeated measures Manova performed on the variables COOP1, COOP2, PROGRES1, and PROGRES2 demonstrated significant between-groups effects for hypnosis (Hotelling's = .2913; exact F(2,44) = 6.41, p = .004). Within-subjects tests using the MWITHIN option of the repeated-measures MANOVA resulted in multivariate significance for Time 1 (Hotelling's = .2702; exact F(2,44) = 5.94, p = .005) and Time 2 (Hotelling's = .2228; exact F(2,44) = 4.90, p = .012).

As can be seen by examining Table 9, univariate results indicated the surgeon's ratings of progress for each group as being the source of significance at each time point. Ratings of cooperation with OT regimen failed to show sufficient between-groups differences to reject the null hypothesis that the group means for cooperation were equal. Figure 5 represents the mean measures of progress and cooperation with OT regimen by group.

Table 9

Means (and Standard Deviations) and Tests of Significance for Rehabilitation and Adherence Measures

DV	CONTROL n =20	HYPNOSIS n =27	F (df = 2,44)	t_p
PROGRES1	4.0 (1.41)	5.19 (.96)	11.70	.000
PROGRES2	4.25 (1.59)	5.48 (1.09)	9.99	.002
COOP1	4.65 (1.23)	4.85 (1.23)	.31	.589
COOP2	4.90 (1.12)	5.15 (1.1)	.58	.452

t_p = one-tailed

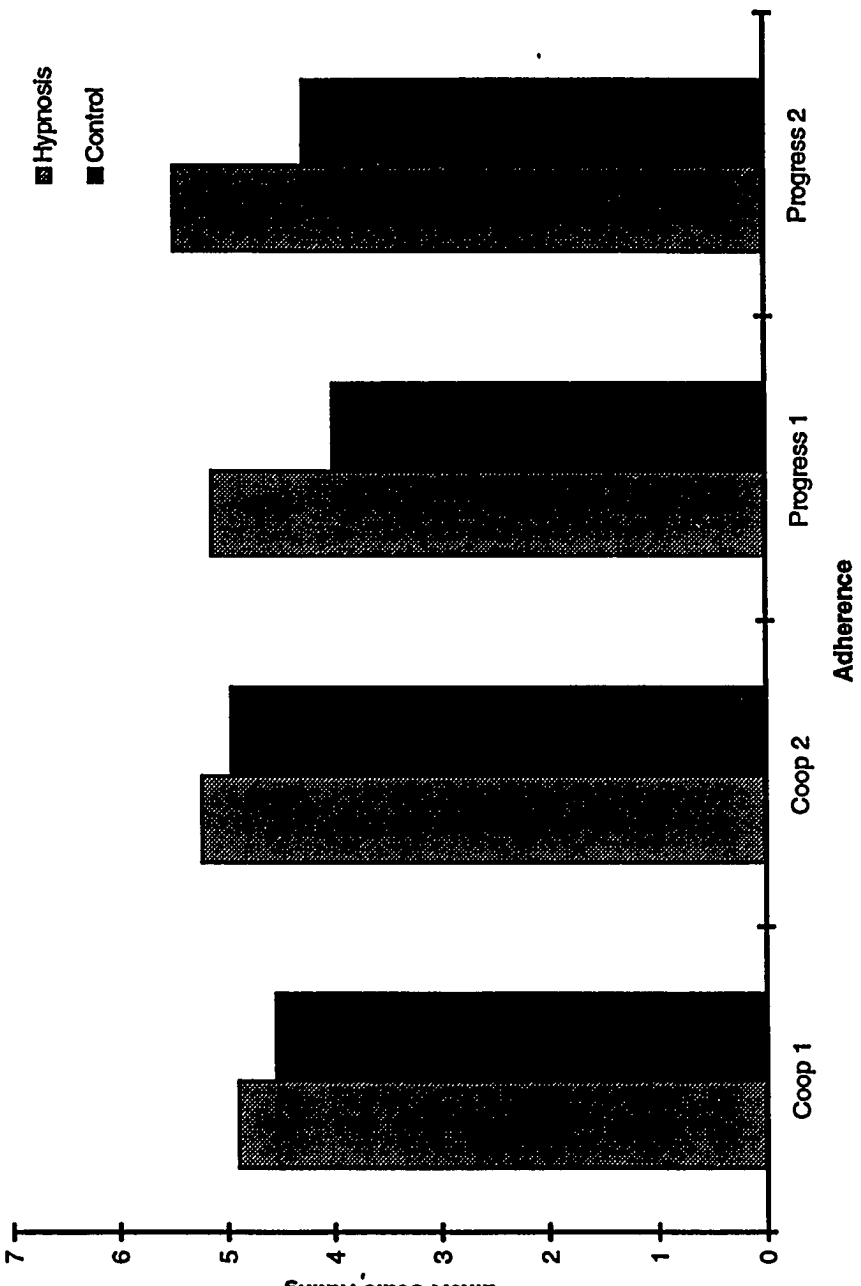

Figure 5

Post-hypnotic Suggestions

Hypotheses 4a and 4b. Hypnosis patients will have higher mean scores on a) ratings of Observed Comfort; and b) ratings of Perceived Comfort during OT sessions across the intervention period than controls.

Hypnosis subjects rated themselves as feeling more comfortable during OT sessions than subjects in the control group, but were not judged by the Ots to look significantly more comfortable than controls. No significant race or gender differences were found for the comfort-related variables. Correlations of these measures and TART scores did not reach significance.

A repeated measures Manova performed on the variables OCOMF1, OCOMF2, PCOMF1, and PCOMF2 demonstrated significant between-groups effects for hypnosis (Hotelling's = .2809; exact $F(2,45)$ = 6.32, p = .004). Within-subjects tests using the MWITHIN option of the repeated-measures MANOVA resulted in multivariate significance for Time 1 (Hotelling's = .2581; exact $F(2,45)$ = 5.80, p = .006) and Time 2 (Hotelling's = .1922; exact $F(2,45)$ = 4.32, p = .019). Univariate results point to PCOMF ratings as the source of significance at each time point, as Table 10 and Figure 6 indicate.

Table 10

Means (and Standard Deviations) and Tests of Significance for Post-hypnotic Suggestions for Comfort During OT Sessions

DV	CONTROL n =21	HYPNOSIS n =27	F (df = 2,45)	t_p
PCOMF1	2.19 (2.50)	5.15 (3.29)	11.69	.000
PCOMF2	3.43 (3.49)	6.07 (3.10)	7.71	.004
OCOMF1	4.91 (2.34)	5.41 (2.41)	.53	.236
OCOMF2	5.67 (2.13)	6.56 (1.85)	2.39	.065

t_p = one-tailed

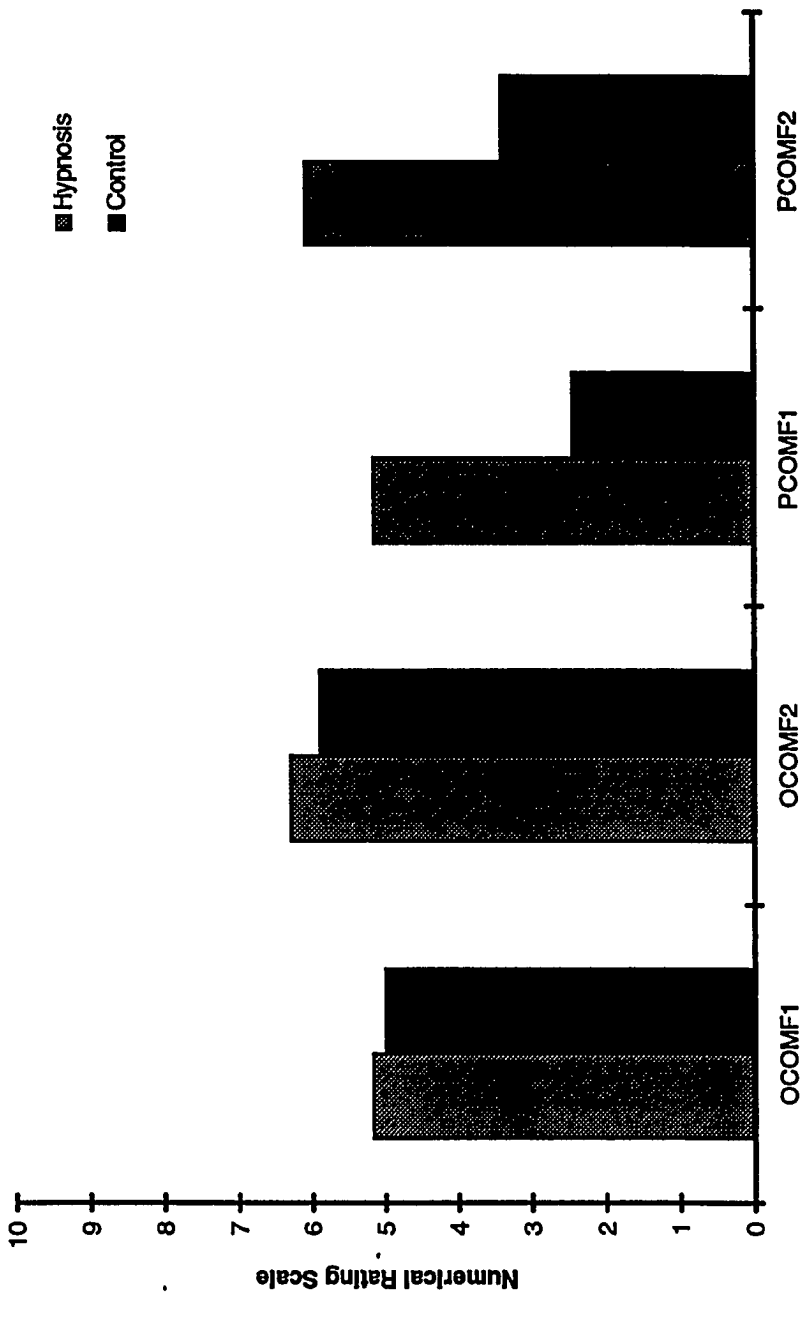

Figure 6

CHAPTER V

DISCUSSION

The purpose of this study was to design and test a cognitive-behavioral intervention (medical hypnosis) for the control of orthopedic post-surgical pain and the enhancement of post-surgical recovery. The intervention consisted of relaxation and therapeutic suggestions for improvements in measures of perceived pain intensity (also called pain; PPI), perceived pain affect (also called suffering; PPA), state anxiety (SANX), surgical recovery, and rehabilitation and adherence. The hypnotic intervention was expected not only to lessen human suffering but also to promote faster healing, to reduce the use of analgesic medication, to improve patient cooperation, and to result in better treatment outcomes because of increased treatment adherence.

This chapter is divided into four sections: a) summary and discussion of findings; b) implications of findings; c) limitations of the study; and d) future directions.

Summary and Discussion of Findings

The major findings from this research are that, within the limitations of the study, the hypnotic intervention tested had a significant impact on reductions in perceived pain intensity, perceived pain affect, and anxiety, as well as on the number of post-surgical complications; it resulted in better progress toward rehabilitation (as rated by surgeons); and it increased patients' perception of comfort during OT sessions. Additionally, patients in the hypnosis group were not found to have required less analgesic medication or have shorter hospitalizations than controls; nor were hypnosis subjects judged by the OTs to be more cooperative or to look significantly more comfortable than controls during OT sessions across the length of the intervention. The sections that follow address these issues and provide possible explanations.

Discussion of the results of the study will cover the four major areas tested: a) pain, suffering, and anxiety (including the differential effects of hypnosis on the physical and affective dimensions of pain); b) post-surgical recovery; c) rehabilitation and adherence; and d) post-

hypnotic suggestions for comfort during OT sessions. These findings will be discussed in terms of the hypotheses tested.

Pain, Suffering, and Anxiety

Hypotheses 1a, 1b. These hypotheses, which stated that patients in the hypnosis group would have lower ratings of PPI and PPA than controls, were supported. Patients in the hypnosis group experienced significantly less post-surgical pain and suffering than controls.

Effect sizes were obtained for both the multivariate and the univariate results. The multivariate result of hypnosis was about .44, which converges with results of a recent meta-analysis conducted by Kirsch (in press) which yielded effect sizes of around .47 for the effects of hypnosis on outcome variables including anxiety and pain. The univariate effect sizes were measured using partial eta square (Cohen, 1977, cited in Stevens, 1992); according to Stevens, "Cohen characterizes eta square = .01 as small, eta square = .06 as medium, and eta square = .14 as a large effect size" (p.177). Thus, the univariate results revealed very large effect sizes for hypnosis on PPI and PPA (eta sq. = .21 to .36 for PPA and .17 to .28 for PPI). These effect sizes are similar to those found by other experimenters (Hilgard & LeBaron, 1982; Hilgard & Hilgard, 1983; Maurer, 1991). The differences in effect size between PPI and PPA will be discussed further under hypothesis 1d.

Because baseline scores were included in the multiple regression equations, the Beta coefficients can be interpreted as effects of the independent variables on changes in PPI, PPA, and SANX (Kessler & Greenberg, 1981). Hypnosis was more strongly related to reductions in PPA (β = -.62; -.42; -.56) than to reductions in PPI (β = -.34; -.32; -.43); it was least strongly related to reductions in SANX (β = -.14, ns; -.21, ns; -.39). These findings will also be discussed further under hypothesis 1d.

Another finding that will also be explored later is that, after taking into account the effects of baseline scores, gender, and TANX on PPI and PPA, hypnosis explained between 17 and 36 percent of the variance in PPA (depending on the day) but only between 10 and 17 percent of the

variance in PPI. Although the PPI percentages are clinically important, they are low compared with the results for PPA.

It is interesting to note that while hypnotic subjects reported continuous decreases in pain and suffering over the length of the study, controls actually reported an increase in both pain and suffering on Day 4. These increases do not have an obvious explanation, as there were no group differences found in number of additional surgeries performed on any day post-treatment. On Day 4, only one of three additional surgeries involved a control subject. Perhaps the normal course of recovery from orthopedic hand surgery includes increased pain and suffering as patients exercise their limb more, although this experimenter did not come across such data during the literature search. If this were the case, hypnosis would have even greater utility for orthopedic hand-surgery patients than previously thought. Further research is needed in this area, as will be discussed later.

These findings demonstrate that a hypnotic intervention using relaxation and indirect suggestions for comfort modelled after Barber's (1977) RIA can be very effective in reducing both pain and suffering. As described in the Literature Review section, the use of RIA-type interventions has received mixed support. The results of this dissertation add support to Barber's contention that indirect suggestions for pain relief do result in significant decreases in discomfort for clinical populations.

Although these findings were not unexpected given that the beneficial effects of hypnosis on pain have been amply documented, they are important for several reasons: a) there are no other studies addressing the use of hypnosis with orthopedic hand surgery patients; b) given the effect sizes (refer to Table 3) obtained by the intervention tested by this study, and pending replication, the utility of hypnosis with this population appears to be extremely promising; c) this study makes a unique contribution in that pain, suffering, and anxiety measures were not collected immediately following the administration of the treatment as is customary, but at least 24 hours later. The

fact that very large effect sizes for PPI and PPA were still obtained 24 hours post-treatment attests to the robustness of hypnotic effects.

Hypothesis 1c. This hypothesis stated that hypnotic subjects would report lower levels of SANX than controls. This hypothesis was supported in that anxiety reports did differ significantly between groups, but started to do so only after the second treatment (Day 3). Although patients in the hypnosis group reported lower scores than controls every day post-treatment, significant differences between the groups were reached only on the fourth day.

Effect sizes for hypnosis on SANX increased slowly, being small on Day 2 (eta sq. = .02) and moderate on Days 3 and 4 (eta sq. = .07 and .09, respectively). After the effects of baseline scores, gender, and TANX were taken into account, multiple regression analyses indicated that hypnosis explains a significant amount of the variance in SANX (15 percent), but only on Day 4. Although this amount of explained variance is significant both clinically and statistically, it does seem low compared with the results for PPA, which ranged from 17 to 36 percent. Thus, compared with the much larger effect sizes observed for PPA and PPI (as well as with the rapidity of observed reductions), hypnosis appears not to be as effective or efficient in mediating anxiety as it does pain and suffering, at least with this population. On the other hand, perhaps even small reductions in anxiety are sufficient to produce large reductions in PPA which are then reflected in medium to large reductions in PPI.

The reductions in SANX may be small compared to reductions in PPA and PPI, but this does not mean that they were not important. The mean raw scores for SANX obtained from this sample were compared against the raw scores that Spielberger et al. (1983) used to obtain percentiles for their general medical and surgical standardization sample. Spielberger et al. reported S- and T-anxiety raw scores ranging from 20 to 80. The 50th percentile for S-anxiety requires a raw score of 43. Both the control and the experimental groups scored at about the 78th percentile on Day 1. Hypnotic subjects then dropped to the 43rd percentile after one intervention (Day 2) and continued to lower their scores for the next two days (to the 36th and 31st percentiles, respectively). Controls, on

the other hand, remained around the 55th and 58th percentiles for the three days post-treatment. This means that the hypnosis intervention reduced anxiety well below the levels that most general medical and surgical patients tend to report.

The results of this research differ from those found by Maurer (1991) in her study of hypnosis and EMG Myography pain, in that she found significant reductions in state anxiety (as measured by the STAI) after one (and only) hypnotic treatment. Maurer, however, measured her subjects shortly after delivering her intervention, and thus, her subjects may have benefitted from the recent deep sense of relaxation and well-being generated by the hypnotic state as well as from the immediate "proof" that the hypnotic intervention had been effective in reducing pain. In addition, her research participants were outpatients who experienced the exam-related anxiety for only a short period of time whereas the patients in this sample were not only hospitalized for several days, but also had undergone unexpected surgery as the result of traumatic injuries, and some of them faced additional surgery during the time of the study. Under these circumstances, perhaps anxiety is somewhat more resistant to rapid change.

It is also possible that, when high anxiety is present initially, as was the case in the present study, patients require not only repeated interventions but also the opportunity to experience the beneficial effects of those interventions (i.e., pain and suffering reductions) in order to develop positive expectancies (and perhaps mastery) with subsequent decreases in anxiety. Research addressing these areas is needed.

The results of this study disagree with research that has found no effects of hypnosis on anxiety (i.e., DeBenedittis et al., 1989; Wall & Womack, 1989). The Wall and Womack study used a clinical sample undergoing repeated and painful bone marrow aspirations or lumbar punctures. Given the findings of the present study, perhaps Wall and Womack would have found significant effects for hypnosis on anxiety had they administered three instead of two practice sessions prior to the medical procedures, or if they had interspersed the treatments with the procedures.

In regard to the DeBenedittis et al. (1989) study, their lack of positive findings may be explained by the fact that, as the authors discuss, their laboratory experimental condition may not have been sufficiently threatening to produce levels of anxiety as high as those generated in clinical samples by acute pain over several days. The lower levels of anxiety inherent in experimental trials may create a "floor" effect that does not allow for significant change. Because the study used a different measure of anxiety than the one employed here, the results are not directly comparable.

Gender differences. The finding of gender differences in pain and anxiety reports that was uncovered in this study must be understood within the limitations imposed by the small number of females in the sample (n = 9). Nonetheless, it is notable that these differences, namely that females report greater levels of pain and anxiety, are similar to the differences found by Maurer (1991). Maurer explained her findings by saying that two of the females in her sample (N = 45, $n_{females}$ = 30) received nerve-conduction pain examinations that were more painful and repeated more times than the examinations for the rest of the sample. In the present study, however, females did not receive more, or more painful surgery than males.

Thus, an alternative explanation may be that females reported higher scores for PPI, PPA, and SANX because females simply experience pain more intensely than males. A more likely explanation, however, is that females and males in Western societies are socialized differently regarding pain behavior and the expression of distress. Females tend to be more open about their pain and distress experiences than males are, especially when the person asking the questions is female. This tendency was apparent in some of the male subjects, who responded to my questions about anxiety, pain, and suffering by reporting ratings that were lower than expected given the extent and nature of their injuries, and that were even incongruent with their pain behavior (i.e., guarding, grimacing, and such).

Another explanation for the higher reports of anxiety by the females in this sample may be their life circumstances. Several of the women were in abusive relationships; two had injuries

inflicted by their partners; two had been recently diagnosed HIV+; and one had lost her job because of her injury. Under such circumstances, it is not unreasonable to experience and report a high degree of anxiety.

The unexpected finding regarding the change in PPI/PPA pattern for females on the third day (see Figure 3) may be explained by the fact that two of the women required additional surgery on Day 3, and may have felt more anxious at that time as a result. Comparisons of gender differences by group membership were not reported given the small number of females in each cell ($n_{control}$ = 6; $n_{hypnosis}$ = 3).

Regardless of group membership or initial differences between males and females, being female was associated with decreases in anxiety on Day 4. These findings are intriguing and deserving of further study. The small number of females in this sample, however, does not allow for meaningful exploration of these issues. This will be addressed in later sections (i.e, Limitations and Future Directions) of this chapter.

Hypothesis 1d. This hypothesis, which tested Barber's (1990, 1992) contention that hypnosis affects greater changes in suffering (motivational-affective dimension of pain) than in pain intensity (sensory-discriminative dimension of pain), was also supported. Although both groups reported higher levels of suffering than pain at baseline, hypnotic subjects reversed the pattern after the first treatment and reported suffering scores significantly below their pain scores on all days post-treatment, while controls maintained the original pattern of higher suffering scores throughout (see Figure 1).

The results of the multiple regression equations (see Tables 7 and 8) support the above findings regarding the differential effectiveness of hypnosis on pain and suffering. As stated under the discussion of hypotheses 1a and 1b, after the effects of initial scores, gender, and t-anxiety were partitioned out, hypnosis accounted for a greater percentage of the variance in suffering than the variance in pain. On Day 2, for example, hypnosis accounted for three times more

variance in suffering than pain; on Day 3, the difference was 70 percent; and on Day 4, the difference in variance accounted for was almost twice as large for PPA than PPI.

An additional finding of interest was that SANX correlated (positively) much more strongly with PPA than with PPI (refer to Table 5). Several authors (Benedetti & Murphy, 1985; Turk, Meichenbaum, & Genest, 1983) have stated that high anxiety is likely to lead to increased patients' pain perception (the authors did not differentiate between pain dimensions). Although the direction of causality remains at issue, the results of this study indicate that the increases in pain perception (as an all-encompassing term) associated with anxiety are more likely to be related to the motivational-affective, rather than the sensory-discriminative, dimension of pain.

These findings are important because they converge with the results obtained by Price and Barber (1987), and provide additional evidence that hypnotic interventions geared towards lowering affective distress can be effective in managing pain perception in clinical settings as an adjunct to pharmacological intervention. More specifically, these results demonstrate the utility of this type of intervention with orthopedic hand-surgery patients.

Hypothesis 1e. This hypothesis, which stated that hypnotic subjects would require less analgesic medication, was not supported. Medications were divided into major, moderate, and mild following Achterberg et al.'s (1989) model. As in their study, although the means for all types of medication were consistently higher for the control group than for the experimental group, the differences between groups were not significant. The control group had very large SDs when compared with the hypnosis group. The differences were due to extremes in patient behavior in the control group. One patient refused all analgesic medication because of religious reasons, while at least two others requested medication so often that medical staff became seriously concerned about the possibility of addiction and switched them, against their wishes, to an analgesic with less addictive potential.

Reductions in the amount of analgesic medication required were expected to reflect decreases in patients' pain perception. The findings regarding decreased use of pain medication

following hypnotic interventions with varied medical populations have been generally positive. Only two studies involving orthopedic samples and hypnosis were located during the literature search. Bonilla, Quigley and Bowers (1961) and Bartlett (1966) were the only studies so identified in a meta-analysis conducted by Blankfield (1991). Both studies found that hypnosis was associated with significantly less use of analgesic medication.

Achterberg et al. (1989) used two types of relaxation (not hypnosis) with a heterogeneous orthopedic sample. Differences among the groups in their use of analgesic medication were not found to be significant. One explanation provided by Achterberg et al. (1989) was that analgesics are prescribed routinely as part of the post-surgical protocol, and that patients may be administered medications in a standardized fashion. In the present study, however, most analgesics were prescribed PRN (at patient's request), with standard administration of pain medication only during the time immediately following surgery. Thus, this explanation would apply to the major analgesics only.

Although the most obvious explanation is that hypnosis did not reduce pain sufficiently for the decrease to be reflected by reduced usage of analgesics, this is unlikely given the large effect sizes already reported for both PPA and PPI. A more pragmatic and realistic explanation is that medication levels were not reduced because of a confound involving sample characteristics. The population served by the hospital tends to include patients whose requests for analgesics may reflect drug-seeking behavior rather than pain (e.g., several patients in both groups were known to the staff from previous hospitalizations as drug-seeking patients, but only a few admitted current drug use during the screening interview).

Post-surgical Recovery

Hypothesis 2a. The experimental group will have fewer post-surgical complications (COMPLIC) than the control group. This hypothesis was supported. No post-surgical complications were experienced by patients in the hypnosis group while eight instances of complications arose in the control group. These results converge with results obtained by Bartlett (1966) who also found

no complications in her experimental group. There are no other studies linking hypnosis to rate of complications using an orthopedic sample.

Most orthopedic hand surgery patients experience severe pain post-operatively, yet they are expected to participate actively in their acutely painful rehabilitation treatment. They must repeatedly debride their surgical wound (thoroughly and painfully) until it shows the red of raw skin, and also must exercise their injured hand several times a day. Poor adherence leads to complications that can result in loss of function and disfigurement. Some of the complications experienced by the patients in the control group (e.g., joint stiffness, collected pus) may have been avoided through better treatment adherence (i.e., thorough wound self-care; exercising hand as prescribed). Thus, the absence of complications is both a measure of good recovery and of treatment adherence.

Yates and Smith (1989) have written about the relationship between unmanaged acute pain and mortality and morbidity. Whereas mortality may be rare as a consequence of complications of orthopedic hand surgery, morbidity is not. As a matter of fact, the desire to learn about ways to reduce morbidity in this population was one of the main reasons for undertaking this study.

If acute pain really interferes with the healing response, as Hall (1986), Holden-Lund (1988), Park and Putton (1991), and Sunnen (1988) have indicated, perhaps the reductions in pain and suffering achieved through hypnosis in this study do offer an explanation for the findings regarding lack of complications and better post-surgical recovery (progress will be reviewed later) in the experimental group.

The hypnotic intervention tested here included suggestions for a speedy and uncomplicated recovery. The mechanisms through which hypnosis mobilizes inner resources for healing are not well understood, and only further research might be able to tease out the different effects of all the therapeutic suggestions included in the script used. However, relaxation has been linked with enhanced immune function, healing, and reversal of disease (Benson, 1989; Kiecolt-Glaser et al., 1986; Kabat-Zinn, 1990; Ornish, 1990).

Hypothesis 2b. The hypothesis that members of the experimental group would have shorter lengths of stay in the hospital (LS) than the control group was not supported. Although patients in the hypnosis group had a slightly smaller mean number of days in the hospital, the difference was not significant.

Both of the studies already mentioned (Bartlett, 1966; Bonilla et al., 1961) found shorter lengths of stay for the hypnosis group. The Bonilla et al. study had rather impressive results, with the experimental group spending an average of 27 days in the hospital versus 46 days for the control group. Perhaps their results reflect not only the true picture of how cost-effective hypnotic interventions can be, but also the simplicity of a different time in our socioeconomic history.

It was noted by this author that discharge from the hospital did not always depend on patients' achieved recovery. Some patients who had made complete post-surgical recoveries were kept in the hospital because they either did not have the means to pay the clinic fee in order to be seen for follow-up (i.e., patient was unemployed, uninsured, poor) or were illegal aliens who may not return for fear of being deported. Other patients were kept in the hospital until appropriate housing was found for them because of homelessness or other problems. A few patients were held longer because their life circumstances suggested that they might not comply with medication, wound care, or outpatient OT regimen after discharge.

Additionally, even when hypnosis subjects whose injuries were caused by human bites demonstrated complete lack of symptoms of infection, they had to remain in the hospital until the prophylactic antibiotic trial was completed in order to comply with treatment protocols. This safe and understandable precaution may have had a great impact on length of stay, given that almost half of the sample had treatment for actual or potential infection.

Rehabilitation and Adherence

Hypotheses 3a and 3b. The experimental group will receive higher mean scores on measures of a) cooperation (COOP1, COOP2); and b) treatment progress (PROGRES1, PROGRES2) than the control

group. Hypothesis 3b was supported but hypothesis 3a was not supported. Patients in the hypnosis group were rated by their surgeons as making significantly better progress after surgery than patients in the control group, but were not judged by the OTs to be significantly more cooperative than controls.

The statistical findings on cooperation were surprising to this researcher because several OTs and nursing staff pointed out positive differences in patient behavior during the study, usually for members of the experimental group. Although neither OTs nor surgeons nor nurses were aware of group membership, their comments were usually on target. During the time when the hypnosis group was being run, for example, one of the OTs reported that "patients seem able to tolerate more. It (intervention) has made our lives easier." Other unintended effects that were mentioned by the nursing staff included "better patient disposition" and a "more manageable floor" during the first six weeks of the study (while the hypnosis group was being run). In addition, PPI ratings each day post-treatment, and PPA on Day 2 (and strong trend on Day 4) were found to be inversely related to cooperation.

Nonetheless, the ratings of cooperation made by the OTs did not reflect their comments and did not result in statistically significant differences between the groups. One explanation may be that, although OTs were very helpful and enthusiastic about the study, they were also extremely busy because of concurrent changes in location and personnel shortages. They often relied on their memory to reconstruct patients' behavior during past sessions. Towards the end of the study, when the control group was being run, OTs could not fill out the forms until, sometimes, weeks later, and often after the patient had already left. It is likely that their good intentions were translated into ratings very close to the neutral value of the Likert scale (4), which rated the patient as demonstrating average cooperation. This is supported by an examination of the means and standard deviations (Table 9) which shows the means for both groups at values close to 5 with very small and identical standard deviations.

On the other hand, the findings regarding post-operative progress did reflect comments made by the staff regarding improvements in the usual level of patients' adherence. The other two studies using hypnosis with general orthopedic populations (Bartlett, 1966; Bonilla et al., 1961) also reported better progress made by the experimental group, although they did not measure it in terms of surgeons' ratings, but rather used length of stay, early mobility, or absence of complications as the rule. Early mobility was not an appropriate measure for this study because, as previously explained, the protocol for most cases of orthopedic hand-surgery calls for immediate mobilization of the limb.

No effects for gender or race were found for the adherence-related variables, nor were there significant correlations of TART scores with measures of cooperation. The correlation with measures of progress, however, was significant, $r = .40$, $p = .04$. This can be interpreted to mean that deeper levels of hypnosis were moderately and directly related to post-surgical progress.

Given adequate surgeons' skill, post-surgical progress can be thought to occur as a result of different factors, such as the natural healing ability of the organism, the absence of complications, the absence of stressors weakening the body's resources for healing, etc. Although no causal relationships can be inferred from these findings, perhaps depth of hypnosis links with progress through the relaxation response that hypnosis evokes (Edmonston, 1991), which is believed to lead to faster healing (Benson, 1984, 1989; Kiecolt-Glaser, 1986; Ornish, 1990).

In addition, depth of hypnosis also correlated negatively with ratings of PPI, PPA, and SANX. It may be through reduction in these stressors that the healing response is enhanced (Holden-Lund, 1988; Park & Fulton, 1991; Ornish, 1990; Sunnen, 1988; Yates & Smith, 1989). Certainly, further research is warranted in this area.

Post-hypnotic Suggestions for Comfort During OT Sessions

Hypotheses 4a and 4b. The hypnosis group will have higher mean scores on a) ratings of Observed Comfort; and b) ratings of Perceived Comfort during OT sessions than the control group. Hypothesis 4a was not supported; hypothesis 4b was supported.

Patients in the hypnosis group rated themselves as feeling more comfortable during OT sessions than patients in the control group. However, although OTs rated patients in the hypnosis group slightly higher in comfort than controls, the differences were not large enough to reach significance. This means that hypnotic subjects were not judged by the OTs to look significantly more comfortable than controls. These findings are puzzling when one considers that patients who experience themselves as comfortable ought to look comfortable as well. However, this was not the case in this study.

It is possible that patients in the hypnosis group inflated their ratings of perceived comfort to please the experimenter. Although this possibility cannot be discounted, and it highlights one of the limitations of this study, measures taken by others were also significantly related to patients' perception of comfort. Perceived comfort varies in the appropriate direction to fit ratings of progress (i.e., perceived comfort was positively related to progress, $r = .32$, $p = .015$) and of cooperation ($r = .27$, $p = .043$), which were rated by the surgeons and OTs (respectively).

A recently defended dissertation (Epley, 1994) provides another, more plausible explanation for these results. Epley found that, when asked to estimate how much pain a patient was experiencing, nurses were not very accurate in assessing patients' pain. Perhaps OTs are also not very accurate in rating the level of discomfort that their patients experience. In addition, this particular measure suffers from the same deficiency as the measure of cooperation mentioned above. Ratings were made several days after the fact, and reconstructed from memory. A better design would have been to have OTs fill out a scale incorporated into the existing progress note that they must complete as they work with the patient.

The effectiveness of the post-hypnotic suggestions for both perceived and observed comfort during OT sessions was not clearly established. Clarification may require more precise measurement of observed comfort than was done here; this will be addressed further under implications for research.

Implications of Findings

Implications for Theory

The implications of the findings of this study with respect to theory include the areas of pain and hypnosis. In regard to hypnosis theory, two points seem important. The first is that the findings presented here converge with the ideas proposed by Barber (1982, 1990, 1991) regarding the differential effects of indirect hypnotic suggestions for comfort on pain and suffering. Although this point has already been discussed, an explanation different from Barber's is proposed later in this section.

The second point to be elaborated involves an explanation of the findings of this study according to a recently proposed theory of hypnosis. The hypnotic intervention used in this study was designed to produce relaxation as an induction technique. The success of the suggestions for comfort and enhanced healing obtained by that intervention can be best explained by Edmonston's (1991) theory of Anesis (from the Greek aniesis, "to relax," " to let go"). Anesis theory holds that relaxation "precedes and forms the fundamental basis of subsequent phenomena associated with the term hypnosis" (p. 197). According to Edmonston, relaxation results in heightened responsivity to suggestion, or what he terms "hypersuggestibility." Suggestion "misleads the senses by disrupting the central nervous system's interpreting mechanisms" (p. 228), resulting in the observable phenomena of hypnosis.

In the case of this study, the phenomena observed included reductions in pain, suffering, anxiety, and complications, as well as better post-operative progress. The findings regarding post-surgical progress and lack of complications (enhanced healing) fit well with current theoretical tenets about the health benefits of relaxation and imagery (Benson, 1989; Kiecolt-Glaser et al., 1986; Kabat-Zinn, 1990; Ornish, 1990). The findings regarding PPI, PPA, and SANX were intriguing, and deserve further integration.

Barber proposes that the differential effects of hypnosis on PPI and PPA are the result of varying degrees of hypnotic ability in the patient population. However, given the overall pattern

of results obtained in this study, and following from Edmonston's (1991) theory, an alternative explanation for said differential effects is offered.

Perhaps the differences found are due to the effects of indirect hypnotic suggestions for comfort and relaxation on pain gating mechanisms rather than to differences in levels of hypnotizability. The Gate Control theory of pain (Melzac & Casey, 1965, Melzac & Wall, 1982) posits that sensory-discriminative, motivational-affective, and cognitive-evaluative pain information is transmitted via different neural pathways. Inhibition of pain signals is hypothesized to be possible at the level of the spinal cord, the subcortex, and the cerebral cortex. Thus, information from higher brain centers can travel down into the dorsal horns of the spinal cord and open or close the pain gate.

A speculative explanation for how reductions in PPI, PPA, and SANX may have occurred and why PPA seemed to be more strongly affected by hypnosis may be that relaxation acts in two different ways to mediate decreases in the pain experience. One way that relaxation may affect the pain experience may be through the well-known reciprocal inhibition principle proposed by Wolpe (1958), which states that relaxation and anxiety are mutually exclusive. This principle has demonstrated time and time again that the experience of relaxation results in reductions in anxiety. The second way that relaxation may mediate PPI and PPA is through the hypersuggestibility that results as a consequence of the experience of hypnotic relaxation (Edmonston, 1991). This hypersuggestibility, as stated before, potentiates the patient's uncritical acquiescence to the therapeutic suggestions given.

Thus, relaxation can be thought of as reducing anxiety and increasing suggestibility for suggestions of comfort and healing. These suggestions may be accepted by the cortex without rational evaluation thanks to the hypersuggestibility factor, and change the meaning of the pain experience. Meanwhile, the neurochemical reactions propitiated by relaxation (perhaps mediated through the limbic system which regulates affective responses and is also thought to be involved in hypnotic responses (Crasilneck & Hall, 1975)) may act to inhibit anxiety and produce increased

feelings of comfort and well-being, lowering PPA. The decrease in PPA may trigger additional re-evaluations and more positive interpretations of the pain experience by the cortex (mastery? self-efficacy?), and finally pain-reducing messages are sent from the brain into the dorsal horns, closing the pain gate. This mechanism would act like a system of gears with different ratios, so that anxiety would necessitate only a small reduction in order to produce the large changes in PPA required to effect medium-size changes in PPI.

In regard to pain theory, the results of this research add support to the multidimensionality of the pain construct as proposed by the Gate Control theory of pain (Melzac & Casey, 1968; Melzac & Wall, 1965, 1973, 1982). The present study also contributes to pain theory by having begun to tease out the inter-relationships among pain, suffering, and anxiety, as well as the relative contribution of gender to pain and suffering. These findings also lend support to Yates and Smith's (1989) and other's contention that management of acute pain is linked to reduced morbidity.

Implications for Research

One important contribution that this study makes to research is in recognizing the lack of adequate measures available to study certain issues related to orthopedic hand-surgery patients. The most obvious one, given the mixed results for hypotheses 4a and 4b, is in the area of observation of patients' pain behavior by OTs. A valid and reliable scale measuring observable pain behaviors such as grimacing, guarding, vocalizations, gesturing, and such, needs to be developed for this population, or modified from existing scales to fit the pain behaviors of hand-injured patients. An example of such a scale is the University of Alabama-Birmingham Pain Behavior Scale (Richards, Nepomuceno, Riles, & Suer, 1982; used and cited by Jorge, 1992) which only recently came to the attention of this researcher. Good operational definitions for behaviors that indicate cooperation also need to be developed. Equally as important is to train the observers on the assessment instrument until acceptable inter-rater reliability is achieved.

Another problematic measure involves range of motion (ROM). Because of the variety of possible injuries to the hand, not every patient requires that ROM ratings be taken. If taken, the measurements are not done at standardized points in the rehabilitation process, making meaningful assessment of differences difficult if not impossible. Assessment of edema and sensitivity also need to be standardized in order to make comparisons possible.

Along the same lines, tighter research protocols are needed. As noted under Limitations, the people collecting data from patients should be different from those delivering the interventions. The protocol should also set criteria for classifying patients as "discharged" when they reach that point but are kept in the hospital for other reasons.

Changes in patient behavior that occurred secondary to the intervention tested were most apparent to the nursing staff. Future research should take this into account and include measures that tap this rich source of information.

Regarding other implications for research, it is apparent from this study that pain should be conceptualized and measured as multidimensional. Continuing to study pain as a unidimensional construct defeats the purpose of science because it robs us of useful information. In addition, the relative contributions of anxiety, pain, and suffering to the experience of pain need to be studied further. And last, but not least, future research should include a sufficient number of males and females to clarify issues of gender differences in pain experience and pain expression.

Implications for Practice

The most important implication for practice (pending replication of these findings) is that hypnotic interventions for pain management should be offered to patients experiencing pain regardless of how well-managed their pain is through pharmacological methods. The reasons are that the benefits of the hypnotic intervention appear to extend beyond the mere relief of pain into considerably better post-surgical recovery and rehabilitation. The additional expense of providing this service may be more than offset by the potential savings generated by reductions in post-surgical complications, to say nothing about the potential for relief of human suffering.

Additionally, psychologists working in a health care setting would find it useful to understand the inter-relationships among pain, suffering, and anxiety, and take this information into account when psychological interventions are used for pain management. Ideally, all psychologists dealing with patients in pain should be trained in hypnosis and use their training to design and test more effective interventions. Psychologists should also educate the staff, including medical doctors, regarding the nature of hypnosis and the benefits of using it. At the very least, psychologists working with patients in pain ought to know different relaxation exercises and should teach and encourage their patients to use them.

Limitations of the Study

The results of this research may have limited generalizability for the following reasons: a) All patients asked to participate were treated by the same team of surgeons. Having patients from different hospitals and under different, independent surgeons would have been preferable in order to enhance external validity; b) the patient population at Jackson Medical Center is generally of low SES, and results may not generalize to more affluent, private patients. However, most clinical studies are run at public institutions using low SES samples; c) most subjects were young and male, and were suffering from traumatic injuries; therefore, these conclusions are only applicable to these populations; d) European-Americans were under-represented and these results can only be applied to Latino and African-American populations; e) the failure by the OTs to record ratings of cooperation and observed comfort immediately after seeing their patients makes it impossible to ascertain the usefulness of hypnosis in these areas with this population; and f) the use of only one therapist to provide the treatment, rather than several therapists matched for age, gender, and experience also threatens external validity. Using a standardized intervention, although not an optimal treatment decision, was chosen in order to minimize this problem.

The greatest limitation of this study resides in the fact that all the treatments were provided by this experimenter. This choice was made after serious discussion with committee members

and careful consideration of the circumstances and of the consequences regarding both internal validity concerns (possible experimenter bias), and limited generalizability of the results.

It was anticipated that over 120 hypnosis sessions over a period of 12 to 14 weeks would be required to complete the study. Well-trained hypnotherapists willing to volunteer for that length of time could not be found, and paying for the interventions was cost-prohibitive. These problems were weighed against the alternatives of a) having volunteer graduate students with minimal training or experience in hypnosis deliver the treatments; or b) permitting the experimenter, a well-trained, experienced hypnotherapist, to be the sole provider of treatment. It was felt that in order to preserve the integrity of the treatment being tested, the latter choice was preferable.

In an attempt to minimize the concomitant limitations of this choice, it was planned that the hypnotic intervention would be a standard script delivered via audiotape. However, once a trial run was made (11 patients not included in the present sample), it became apparent that the taped version of the script was not appropriate for all patients. It contained post-hypnotic suggestions for comfort and preparation for surgery, as well as suggestions for regaining normal bowel, bladder, and sleep function immediately after surgery. These suggestions were deemed likely to confuse and scare patients who were not going to have additional surgery. The best solution, under the circumstances, was to deliver the prepared script live, omitting suggestions regarding surgery for those patients not scheduled to have additional surgical interventions.

An additional limitation is the use of the term hypnosis; as defined by the type of intervention tested by this study, hypnosis refers to <u>indirect</u> suggestions for relaxation, comfort, enhanced recovery, etc. No claims can be made about the effectiveness of hypnotic interventions using direct suggestions.

A related issue is the use of a standard hypnotic script. This is contrary to the traditional clinical hypnosis paradigm, where induction methods, wording of suggestions, and close attention to patient's responses permit maximization of treatment effects through individual

tailoring of the litany. Although this was necessary for the purposes of the study, it is like testing the effectiveness of an intervention that, in practice, will be used in a different form.

The last point to be made regarding external validity refers to the findings on gender differences. As stated in the discussion section, the small number of females in the sample severely limits the generalizations that can be made, and thus the findings must be viewed with caution until replication is obtained.

As it refers to internal validity, experimenter bias must be considered as a potential threat to the validity of the results. Although conscientious efforts were made to avoid biases, this writer would certainly feel more comfortable presenting these findings if she had been blind to group assignment when collecting the data. In retrospect, a better (and less expensive) choice would have been to pay blind assistants to collect the patient data.

Another issue of internal validity involves the decision not to test for level of hypnotizability. Increased understanding of the relationships between PPI, PPA, and hypnotizability proposed by Barber (1990, 1991) may have been possible, but because the design did not include measures of hypnotizability, the issue could not be addressed.

As previously stated, the ratings of observed comfort made by the OTs were not operationalized clearly enough to facilitate the recognition of patient discomfort in a valid and reliable way. Additionally, OT measures should have included assessment of inter-rater reliability, but this was not done. In general, the ratings made by the OTs are of limited validity and reliability because many of them were made too long after the session had ended, and were reconstructed from memory as opposed to records. Solutions for this problem were discussed under the implications for research section.

Another problem was the use of listwise deletion which resulted in 13 cases not being included in the MANOVA tests (Some data could not be collected because some patients either did not require OT or OT was started after the patient had left the hospital; three patients left the hospital before all the data for the last day could be collected; and in two cases, the anxiety data

were collected but, unfortunately, the written records were accidentally destroyed). However, the least number of cases included in any analysis was 47 and power was deemed to be sufficient. The number of cases not included in the analyses were about the same for each group (Control = 7, Hypnosis = 6).

Future Directions

The logical first step into future directions would be replication of the study utilizing the suggestions given to improve design and measurement. However, many other questions were raised during the course of this project. Chief among them is the need to know more about the patterns of pain after orthopedic hand surgery because orthopedic pain has not been well studied. How do levels of pain, suffering, and anxiety change as recovery and rehabilitation occur? Is the pain experience, especially as it refers to intensity, related to the severity of the injury or disease, or to the type of surgery performed? Disfiguring and/or disabling types of injuries or diseases are theoretically linked to intense emotional distress, and thus, are they more highly related to suffering? These are questions that could be examined by future studies.

Another question to be clarified is that of how the relationships among pain, suffering, and anxiety contribute to the experience of pain. The same is true of gender differences. Including adequate numbers of women in pain studies would go a long way towards answering questions such as why do women score higher initially on measures of pain and anxiety? Should interventions address different pain dimensions depending on the gender of the patient?

Yet another question arises regarding the mechanisms through which the effects found here were achieved, both in regard to pain and in regard to healing. Which were the effective components of this intervention? Which of the many posthypnotic suggestions given were most powerful? How many times must a suggestion be repeated before its effects can be observed? And how can the model proposed by this experimenter be tested? Are small reductions in anxiety sufficient to produce significant increases in positive expectancies, self-efficacy, and/or a sense of mastery? How do

these variables relate to pain and suffering? These questions deserve to be clarified and the answers put to use in developing better pain management interventions.

Regarding theory, future research may want to use designs that test direct versus indirect hypnotic suggestions; suggestions given under hypnosis versus suggestions given under different methods of relaxation and versus "waking" suggestions.

Evaluation of effect sizes should be made both immediately after the treatments and at several points afterward, to assess the long-term potency of different interventions on pain-related measures. Effects on other areas that affect patient comfort, such as sleep, should also be taken into account by future research. Effects on levels of stress on the unit as perceived by nursing staff would be important to ascertain, as those effects would be likely to affect not only patient care but also staff burn-out.

Given the traumatic nature of the injuries suffered by the patients in this sample, another area of interest would be to examine the incidence and effects of PTSD in this population, and to evaluate the contribution of hypnosis in the relief of pain under such conditions. Additionally, would hypnosis be as effective in reducing symptoms associated with PTSD as it seems to be regarding pain and suffering?

There seem to be many more questions than answers regarding the adjunctive treatment of pain in this population. However, the results of the hypnotic intervention tested by this study have started to provide some answers, and hopefully will generate further research.

In conclusion, the findings presented here demonstrate that hypnotic interventions geared towards lowering affective distress can be effective in managing pain perception in clinical settings as an adjunct to pharmacological intervention. More specifically, these results demonstrate that the utility of hypnotic interventions with orthopedic hand-surgery patients goes beyond the mere control of pain. The post-hypnotic suggestions for better healing appear to have resulted in decreases in the number of post-surgical complications and enhanced adherence and rehabilitation.

The potential benefits of this type of intervention on human suffering and conservation of resources for this population are great, and highlight the important role that the psychologist plays as a member of a multidisciplinary team in a medical setting. It is hoped that this research contributes to enlarging that role and enhancing the recognition due to our profession in the health care field.

References

Achterberg, J., Kenner, C., & Casey, D. (1989). Behavioral strategies for the reduction of pain and anxiety associated with orthopedic trauma. Biofeedback and Self-Regulation, 14, 101-114.

Allen, B. L. (1983). The use of hypnotherapy in the rehabilitation of cerebral-vascular patients. Unpublished dissertation. East Texas State University.

Alman, B. M., & Carney, R. E. (1980). Consequences of direct and indirect suggestions on success of posthypnotic behavior. American Journal of Clinical Hypnosis, 23, 112-118.

Appel, P. R. (1990). Clinical applications of hypnosis in the physical medicine and rehabilitation setting: Three case reports. American Journal of Clinical Hypnosis, 33, 85-93.

Baker, R. A. (1990). They call it hypnosis. Buffalo: Prometheus Books.

Barabasz, A. F., & Barabasz, M. (1992). Research designs and considerations. In E. Fromm & M. R. Nash (Eds.), Contemporary Hypnosis Research (pp. 427-458). New York: Guilford Press.

Barber, J. (1977). Rapid induction analgesia: A clinical report. American Journal of Clinical Hypnosis, 19, 138-147.

Barber, J. (1982). Managing acute pain. In J. Barber & C. Adrian (Eds.), Psychological Approaches to the Management of Pain (pp. 168-185). New York: Brunner Mazel.

Barber, J. (1986). Hypnotic analgesia. In A. D. Holzman & D. C. Turk (Eds.), Pain Management: A Handbook of Psychological Treatment and Approaches (pp. 151-167). New York: Pergamon Press.

Barber, J. (1990). Hypnosis. In J. J. Bonica (Ed.) The management of pain (2nd ed., Vol. 2, pp. 1733-1741). Philadelphia: Lea & Febiger.

Barber, J. (1991). The Locksmith Model: Accessing Hypnotic Responsiveness. In S. J. Lynn & J. W. Rhue (Eds.), Theories of Hypnosis: Current Models and Perspectives (pp.241-274). New York: Guilford.

Barber, J., & Mayer, D. (1977). Evaluation of the efficacy and neural mechanism of a hypnotic analgesia procedure in experimental and clinical dental pain. Pain, 4, 41-48.

Barber, T. X. (1969). Hypnosis: A Scientific Approach. New York: Van Nostrand, Reinhold.

Bartlett, E. E. (1966). Polypharmacy versus hypnosis in surgical patients. Pacific Medicine and Surgery, 74, 109-112.

Becker, M. H. (1974). The Health Belief Model and sick role behavior. In M. H. Becker (Ed.), The Health Belief Model and Personal Health Behavior (pp. 82-92). Thorofare, New Jersey: Charles B. Slack.

Benedetti, C., & Murphy, T. M. (1985). Non-pharmacological methods of acute pain control. In G. Smith & B. G. Covino (Eds.). Acute Pain (pp. 257-269). London: Butterworths.

Benson, H. (1984). Beyond the relaxation response. New York: Times Books.

Benson, H. (1989). Hypnosis and the relaxation response. Gastroenterology, 96, 1609-1611.

Bernheim, H. (1902). Suggestive Therapeutics: A treatise on the nature and uses of hypnotism (C. A. Herter, Trans.). New York: G. P. Putnam.

Blankfield, R. P. (1991). Suggestion, relaxation, and hypnosis as adjuncts in the care of surgery patients: A review of the literature. American Journal of Clinical Hypnosis, 33, 172-186.

Bonica, J. J. (1990). The management of pain (2nd ed., Vol. 2). Philadelphia: Lea & Febiger.

Bonilla, K. B., Quigley, W. F., & Bowers, W. F. (1961). Experiences with hypnosis on a surgical service. Military Medicine, 126, 364-370.

Bowers, K. S., & Kelly, P. (1979). Stress, disease, psychotherapy, and hypnosis. Journal of Abnormal Psychology, 85, 490-505.

Boyne, G. (Ed.). (1982). Hypnosis: New Tool in Nursing Practice. Glendale, California: Westwood.

Brown, D. P. (1992). Clinical hypnosis research since 1986. In E. Fromm & M. R. Nash (Eds.), Contemporary Hypnosis Research (pp. 427-458). New York: Guilford Press.

Brown, P. (1991). The Hypnotic Brain. New Haeven, Conn.: Yale University Press.

Brown, D. P., & Fromm, E. (1987). Hypnosis and Behavioral Medicine. Hillsdale, N.J.: Lawrence Erlbaum Associates.

Burke, F. D., Dias, J. J., Lunn, P. G., & Bradley, M. (1991). Providing care for hand disorders. The Journal of Hand Surgery, 16b, 13-18.

Caillet, R. (1983). Hand Pain and Impairment (3rd ed.). Philadelphia: F. A. Davies.

Clark, W. C., Carroll, J. D., Yang, J. C., & Janal, M. N. (1986). Multidimensional scaling reveals two dimensions of thermal pain. Journal of Experimental Psychology: Human Perception and Performance, 12, 103-107.

Clarke, J. C., & Johnson, J. A. (1983). Hypnosis and behavior therapy: The treatment of anxiety and phobias. New York: Springer.

Crasilneck, H. B., & Hall, J. A. (1975). Clinical Hypnosis: Principles and Applications. New York: Grune & Stratton.

Crawford, H. J., & Gruzelier, J. H. (1992). A midstream view of the neuropsychophysiology of hypnosis: Recent research and future directions. In E. Fromm & M. R. Nash (Eds.), Contemporary Hypnosis Research (pp. 227-266). New York: Guilford Press.

DeBenedittis, G., Panerai, A. A., & Villamira, M. A. (1989). The International Journal of Clinical and Experimental Hypnosis, 37, 55-69.

Downie, W. W., Leatham, P. A., Rhind, V. M., Wright, V., Branco, J. A., & Anderson, J. A. (1978). Studies with pain rating scales. Annals of the Rheumatic Diseases, 37, 378-381.

Edmonston, W. E. (1991). Anesis. In S. J. Lynn & J. W. Rhue (Eds.), Theories of Hypnosis: Current Models and Perspectives (pp.241-274). New York: Guilford.

Epley, D. (1994). The effects of personality traits in the assessment and management of pain. Unpublished dissertation, University of Miami, Coral Gables, Florida.

Erickson, M. (1952/1980). Deep Hypnosis and its induction. In E. Rossi (Ed.), The collected papers of Milton H. Erickson on hypnosis. I. The nature of hypnosis and suggestion. New York: Irvington. Originally published in L. LeCron (Ed.), Experimental hypnosis (pp. 139-167). New York: MacMillan.

Erickson, M. (1952/1980). An introduction to the study and application of hypnosis for pain control. In E. Rossi (Ed.), The collected papers of Milton H. Erickson on hypnosis. IV. Innovative Hypnotherapy. New York: Irvington. Originally published in L. LeCron (Ed.), Experimental Hypnosis (pp. 139-167). New York: MacMillan.

Erickson, M. H., Rossi, E. L., & Rossi, S. I. (1976). Hypnotic Realities: The induction of clinical hypnosis and forms of indirect suggestion. New York: Irvington Press.

Ewin, D. M. (1986). The effect of hypnosis and mental sets on major surgery and burns. Psychiatric Annals, 16, 115-118.

Feuerstein, M. (1989). Definitions of pain. In D. C. Tollison (Ed.), Handbook of Chronic Pain Management. Baltimore: Williams and Wilkens.

Feuerstein, M., Labbe, E. E., & Kuczmierczyk, A. R. (1986). Health Psychology: A psychobiological perspective. New York: Plenum Press.

Fordyce, W. E. (1978). Learning processes in pain. In R. A. Sternbach (Ed.), The Psychology of Pain (p. 200). New York: Raven Press.

Frazier, W. H., Miller, M., Fox, R. S., Brand, D., & Finseth, F. (1978). Hand Injuries: Incidence and Epidemiology in an Emergency Service. Journal of the american College of Emergency Physicians, 7, 265-268.

Fricton, J. R., & Roth, P. (1985). The effects of direct and indirect hypnotic suggestions for analgesia in high and low susceptible subjects. American Journal of Clinical Hypnosis, 27, 226-231.

Fromm, E., & Nash, M. R. (Eds.). (1992). Contemporary Hypnosis Research. New York: Guilford.

Gaul, J. S., (1987). Identifiable costs and tangible benefits resulting from the treatment of acute injuries of the hand. Journal of Hand Surgery, 5, 966-970.

Gracely, R. H. (1979). Psychophysical assessment of human pain. In J. J. Bonica (Ed.), Advances in pain research and therapy. Vol. 3 (pp. 805-824). New York: Raven Press.

Grzesiak, R. C. (1991). Chronic pain: A psychobehavioral perspective. In L. P. Ince (Ed.), Behavioral Psychology in Rehabilitation Medicine: Clinical Applications (pp. 248-300). Baltimore: Williams & Wilkins.

Guidano, V. F. (1987). Complexity of the self. New York: Guilford.

Guidano, V. F. & Liotti, G. (1985). A constructivistic foundation for cognitive therapy. In M. J. Mahoney & A. Freeman (Eds.), Cognition and Psychotherapy. New York: Plenum.

Hall. H. (1986). Hypnosis, suggestion, and the psychology of healing: A historical perspective. Advances, 3, 29-37.

Hart, B. B. (1991). Hypnosis and pain. In M. Heap & W. Dryden (Eds.), Hypnotherapy: A Handbook (87-107). Philadelphia:
Open University Press.

Hilgard, E. R. (1986). Hypnosis and pain. In R. A. Sternbach (Ed.), The Psychology of Pain (2nd ed.). (pp. 197-221). New York: Raven Press.

Hilgard, E. R. (1987). Research advances in Hypnosis: Issues and methods. The International Journal of Clinical and Experimental Hypnosis, 35, 248-264.

Hilgard, E. R., & Hilgard, J. R. (1983). Hypnosis in the relief of Pain (rev. ed.). Los Altos, California: Kaufman.

Hilgard, J. S., & LeBaron, S. (1982). Relief of anxiety and pain in children and adolescents with cancer: Quantitative measures and clinical observations. International Journal of Clinical and Experimental Hypnosis, 30, 417-442.

Holden-Lund, C. (1988). Effects of relaxation with guided imagery on surgical stress and wound healing. Research in Nursing and Health, 11, 235-244.

Holzman, A. D., & Turk, D. C. (Eds.). (1986). Pain Management. New York: Pergamon Press.

Janet, P. (1925). Psychological healing: A historical and clinical study (E. Paul & C. Paul, Trans.). New York: Macmillan.

Jensen, M. P., & Karoly, P. (1992). Self-report scales and procedures for assessing pain in adults. In D. C. Turk and R. Melzac (Eds.), Handbook of Pain Assessment (pp. 135-151). New York: Guilford Press.

Jensen, M. P., Karoly, P., & Braver, S. (1986). The measurement of clinical pain intensity: a comparison of six methods. Pain, 27, 117-126.

Jensen, M. P., Karoly, P., O'Riordan, E. F., Bland, F., Jr., & Burns, R. S. (1989). The subjective experience of acute pain: An assessment of the utility of 10 indices. Clinical Journal of Pain, 5, 153-159.

Jorge, M. C. (1992). The relationship of cognitive-behavioral strategies to pain behavior and sickness impact in chronic low-back pain patients. Unpublished dissertation, University of Miami, Coral Gables, Florida.

Kabat-Zinn, J. (1990). Full Catastrophe Living: A Practical Guide to Mindfulness, Meditation, and Healing. New York: Delacorte Press.

Kaplan, R. M., Metzger, G., & Jablecki, C. (1983). Brief cognitive and relaxation training increases tolerance for a painful clinical electromyographic examination. Psychosomatic Medicine, 45, 155-162.

Karoly, P. (Ed.). (1985). Measurement strategies in Health Psychology. New York: John Wiley & Sons.

Keefe, F. J., Schapira, B., Williams, R. B., Brown, C., & Surwit, R. S. (1981). EMG-assisted relaxation training in the management of chronic low back pain. American Journal of Clinical Biofeedback, 4, 93-103.

Kellerman, J., Zeltzer, L., Ellenberg, L., & Dash, J. (1983). Adolescents with cancer: Hypnosis for the reduction of the acute pain and anxiety associated with medical procedures. Journal of Adolescent Health Care, 4, 85-90.

Kessler, R. C. & Greenberg, D. (1981). Linear panel analysis. San Diego, CA: Academic Press.

Kiecolt-Glaser, J. K., Glaser, R., Strain, E. C., Stout, J. C., Tarr, K. L., Holliday, J. E., & Speicher, C. E. (1986). Modulation of cellular immunity in medical students. Journal of Behavioral Medicine, 9, 5-21.

Kremer, E., Atkinson, J.H., & Ignelzi, R. J. (1981). Measurement of pain: Patient preference does not confound pain measurement. Pain, 10, 241-248.

Lynn, S. J., Neufeld, V., & Matyi, C. L. (1987). Inductions versus suggestions: Effects of direct and indirect wording on hypnotic responding and experience. Journal of Abnormal Psychology, 96, 76-79.

Mahoney, M. J. (1991). Personal change processes: The scientific foundations of psychotherapy. New York: Basic Books.

Malone, M. D., Kurtz, R. M., & Strube, M. J. (1989). The effects of hypnotic suggestion on pain report. American Journal of Clinical Hypnosis, 31, 221-230.

Manusov, E.G. (1990). Clinical applications of hypnotherapy. The Journal of Family Practice , 31, 180-184.

Matthews, W. L., Bennett, H., Bean, W., & Gallagher, M. (1985). Indirect versus direct hypnotic suggestions-an initial investigation: A brief communication. International Journal of Clinical and Experimental Hypnosis, 33, 219-223.

Maurer, C. (1991). A comparison of cognitive-behavioral and hypnotic techniques in the management of electromyography pain. Unpublished doctoral dissertation, University of Iowa.

Melzac, R. (1975). The McGill Pain Questionnaire: Major properties and scoring methods. Pain, 1, 277-299.

Melzac, R., & Casey, K. L. (1968). Sensory, motivational, and central control determinants of pain: A new conceptual Model. In D. Kenshalo (Ed.), The Skin Senses (pp. 423-439). Springfield, Illinois: Thomas.

Melzac R., & Katz, J. (1992). The McGill Pain Questionnaire: Appraisal and current status. In D. C. Turk and R. Melzac (Eds.), Handbook of Pain Assessment (pp. 135-151). New York: Guilford Press.

Melzac, R., Katz, J., & Jeans, M. E. (1985). The role of compensation in chronic pain: Analysis using a new method of scoring the McGill Pain Questionnaire. Pain, 23, 101-112.

Melzac, R., & Perry, C. (1975). Self-regulation of pain: The use of alpha-feedback and hypnotic training for the control of chronic pain. Experimental Neurology, 46, 452-469.

Melzac, R., Taenzer, P., Feldman, P., & Kinch, R. A. (1981). Labour is still painful after prepared childbirth training. Canadian Medical Association Journal, 125, 357-363.

Melzac, R., & Torgerson, W. S. (1971). On the language of pain. Anesthesiology, 34, 50-59.

Melzac, R., & Wall, P. D. (1965). Pain Mechanisms: A new theory. Science, 150, 971-978.

Melzac, R., & Wall, P. D. (1973). The Puzzle of Pain. New York: Basic Books.

Melzac, R., & Wall, P. D. (1982). The Challenge of Pain. New York: Basic Books.

Morris, D. B. (1992). The place of pain. Advances, 8, 3-24.

Orne, M. T. & Dinges, D. F. (1989). Hypnosis. In H. I. Kaplan & B. J. Sadock (Eds.), Comprehensive Textbook of Psychiatry/V (pp. 1501-1516). Baltimore: Williams & Wilkins.

Orne, M. T. & Dinges, D. F. (1989). Hypnosis. In P. D. Wall & R. Melzac (Eds.), Textbook of Pain (pp. 11021-1031). New York: Churchill Livingstone.

Ornish, D. (1990). Program for reversing heart disease. New York: Ballantine Books.

Park, G., & Fulton, B. (1991). The Management of Acute Pain. Oxford: Oxford University Press.

Parry, C. B. W., Salter, M., Millar, D., & Fletcher, I. (1991). Rehabilitation of the Hand (4th Ed.). London: Butterworths.

Perl, E. R. (1980). Afferent basis of nociception and pain: evidence from the characteristics of sensory receptors and their projections to the spinal dorsal horn. In J. J. Bonica (Ed.), Pain (pp. 19-45). New York: Raven Press.

Price, D. D. (1988). Psychological and Neural Mechanisms of Pain. New York: Raven Press.

Price, D. D., & Barber, J. (1987). An analysis of factors that contribute to efficacy of hypnotic analgesia. Journal of Abnormal Psychology, 96, 46-51.

Pulvertaft, R. G. (1992). Psychological aspects of hand injuries. In P. Raj (Ed.), Practical management of pain (2nd ed., pp. 6-12). St. Louis: Mosley Year Book.

Reading, A. E. (1989). Testing pain mechanisms in persons in pain. In P. D. Wall & R. Melzac, (Eds.), Textbook of Pain (pp. 269-280). London: Churchill Livingstone.

Richards, J. S., Nepomuceno, C., Riles, M., & Suer, Z. (1982). Assessing pain behavior: The UAB Pain Behavior Scale. Pain, 14, 393-398.

Rosenstock, I. M. (1974). The Health Belief Model and preventative health behaviour. Health and Education Monographs, 2, 354.

Rossi, E. L. & Cheek, D. B. (1988). Mind-body Therapy: Ideodynamic Healing in Hypnosis. New York: W. W. Norton.

Sacerdote, P. (1980). Hypnosis and terminal illness. In G. D. Burroughs & L. Dennerstein (Eds.), Handbook of Hypnosis and Psychosomatic medicine (pp. 421-442). Amsterdam: Elsevier /North Holland.

Sarbin, T. (1950). Contributions to role-taking theory: I. Hypnotic behavior. Psychology Review, 57, 255-270.

Scott, J., & Huskisson, E. C. (1976). Graphic representation of pain. Pain, 2, 175-184.

Seymour, R. A. (1982). The use of pain scales in assessing the efficacy of analgesics in post-operative dental pain. European Journal of Clinical Pharmacology, 23, 441-444.

Seymour, R. A., Simpson, J. M., Charlton, J. E., & Phillips, M. E. (1985). An evaluation of length and end-phrase of visual analogue scales in dental pain. Pain, 21, 177-186.

Smith, G., & Covino, B. G. (1985). Acute Pain. London: Butterworths.

Spanos, N. P. & Chaves, J. F. (1989). Hypnosis: The Cognitive-Behavioral Perspective. Buffalo: Prometheus Books.

Spanos, N. P., Kennedy, S. K., & Gwynn, M. I. (1984). Moderating effects of contextual variables on the relationship between hypnotic susceptibility and suggested analgesia. Journal of Abnormal Psychology, 93, 285-294.

Spanos, N. P., Perlini, A. H., & Robertson, L. A. (1989). Hypnosis, suggestion, and placebo in the reduction of experimental pain. Journal of Abnormal Psychology, 98, 285-293.

Spanos, N. P., Radke-Bodorik, H. L., Ferguson, J. D., & Jones, B. (1979). The effects of hypnotic susceptibility, suggestions for analgesia, and the utilization of cognitive strategies on the reduction of pain. Journal of Abnormal Psychology, 88, 282-292.

Spanos, N. P., Voorneveld, P. W., & Gwynn, M. I. (1987). The mediating effects of expectation on hypnotic and nonhypnotic pain reduction. Imagination, Cognition, and Personality, 6, 231-245.

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). Manual for the State-Trait Anxiety Inventory. Palo Alto: Consulting Psychologists Press.

Spielberger, C. D., Gorsuch, R. L., Lushene, R. E., Vagg, P. R., & Jacobs, G. A. (1983). Manual for the State-Trait Anxiety Inventory (Self-Evaluation Questionnaire). Palo Alto: Consulting Psychologists Press.

Spiegel, D. (1983). Hypnosis with medical/surgical patients. General Hospital Psychiatry, 5, 265-277.

Spiegel, D., & Bloom, J. R. (1983). Group therapy and hypnosis reduce metastatic breast carcinoma pain. Psychosomatic Medicine, 45, 333-339.

Spiegel, H., & Spiegel D. (1978). Trance and Treatment: Clinical Uses of Hypnosis. Washington, D.C.: American Psychiatric Press.

Sternbach, R. A. (1986). Clinical aspects of pain. In R. A. Sternbach (Ed.). The Psychology of Pain (pp. 223-239). New York: Raven Press.

Stenn, P. G., Mothersill, K. J., & Brooke, R. I. (1979). Biofeedback and a cognitive behavioral approach to treatment of myofascial pain dysfunction syndrome. Behavior Therapy, 10, 29-36.

Stevens, J. (1992). Applied multivariate statistics for the Social Sciences (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum.

Sunnen, G. V. (1988). Hypnosis for health. Advances, 5, 5-12.

Tan, S. Y. (1982). Cognitive and cognitive-behavioral methods for pain control: A selective review. Pain, 12, 201-228.

Tart, C. T. (1970). Self-report scales of hypnotic depth. The International Journal of Clinical and Experimental Hypnosis, 18, 105-124.

Turk, D. C., Meichenbaum, D., & Genest, M. (1983). Pain and Behavioral Medicine: A cognitive-behavioral perspective. New York: Guilford Press.

Turk, D. C., & R. Melzac (Eds.). (1992). Handbook of Pain Assessment. New York: Guilford Press.

Turk, D. C., Rudy, T. E., & Salovey, P. (1985). The McGill Pain Questionnaire reconsidered: Confirming the factor structures and examining appropriate uses. Pain, 21, 385-397.

Van Gorp, W. C., Meyer, R. G., & Dunbar, K. D. (1985). The efficacy of direct versus indirect hypnotic induction techniques on reduction of experimental pain. The International Journal of Clinical and Experimental Hypnosis, 33, 319-328.

Wadden, T. A., & Anderton, C. H. (1982). The clinical use of hypnosis. Psychological Bulletin, 91, 215-243.

Wain, H. J. (1980). Pain control through the use of Hypnosis. American Journal of Clinical Hypnosis, 23, 41-46.

Wain, H. J. (1986). Pain control with hypnosis in consultation and liason psychiatry. Psychiatric Annals, 16, 106-109.

Wall, V. J., & Womack, W. (1989). Hypnotic versus active cognitive strategies for alleviation of procedural distress in pediatric oncology patients. American Journal of Clinical Hypnosis, 31, 181-191.

Wallenstein, S. L., Heidrich, J., III, Kaiko, R., & Houde, R. W. (1980). Clinical evaluation of mild analgesics: The measurement of clinical pain. British Journal of Clinical Pharmacology, 10, 319S-327S.

Weisemberg, M. (1977). Pain and pain control. Psychological Bulletins, 84, 1008-1044.

Weitzenhoffer, A. M. (1953). Hypnotism: An objective study in suggestibility. New York: John Wiley & Sons.

Wolff, B. B. (1986). Behavioral measurement of human pain. In R. A. Sternbach (Ed.), The Psychology of Pain (2nd. ed., pp. 121-152). New York: Raven Press.

Wolpe, J. (1958). Psychotherapy by reciprocal inhibition. Stanford, CA: Stanford University Press.

Yates, D. A. H., & Smith, M. A. (1989). Orthopaedic pain after trauma. In P. D. Wall & R. Melzac (Eds.), Textbook of Pain (pp. 327-334). New York: Churchill Livingstone.

Zahourek, R. P. (1990). Clinical Hypnosis and Therapeutic Suggestion in Patient Care. New York: Brunner Mazel.

Zilbergeld, B. (1986). Choosing inductions. In B. Zilbergeld, M. G. Edelstien, & D. L. Araoz (Eds.), Hypnosis: Questions and Answers (pp. 103-109). New York: W. W. Norton.

APPENDIX A

INSTRUMENTS

APPENDIX A

SCREENING INTERVIEW

Name _____ M_ F_ Date --/--/--

Age ___ DOB __/__/__ (Must be earlier than today's date, 1975)

RACE: Euro-American_ African-American_ Hispanic_ (Country_____)

What are you in the hospital for?

When/how did your problem start?

Have you had surgery before? Y_ N_

What kind?_____

Do you have any other conditions that require you to take medication or visit a doctor or a therapist regularly? Y_ N_

Can you tell me about them? _____

Have you had medical or psychological treatment in the past? Y_ N_

What other medications have you taken in the past?

_____

Have you ever been in the hospital for nervous conditions? Y_ N_

_____

Do you smoke cigarettes? Y_ N_ How many per day? ___per day

Have you ever thought of quitting smoking? Y_ N_

Do you drink coffee or colas? How many cups/cans per day?

Y_ N_ ; ___ cups/cans per day

Have you ever thought of quitting drinking coffee or colas? Y_ N_

How much alcohol do you drink? No_; ___per day

Do you use illegal drugs? Y_ N_

Do you take prescription drugs such as Valium, Librium, etc.? Y_ N_

How often?

Have you ever thought of quitting alcohol or drugs? Y_ N_

Has anyone ever hassled you about your drinking or drug use? Y_ N_ Ever drink in the morning to stop yourself from shaking? Y_ N_

Do you consider yourself a nervous or anxious person? Y_ N_

Is anyone in your family a nervous or anxious person? Y_ N_

Anyone in your family with serious medical problems? Y_ N_

Any kind of emotional or mental problem? Y_ N_

How many people were in your family when you were growing up? __

How far did you get in school?_____

What kind of work do you do?_____ Full time_ Part time_ Retired_

Not working_ Annual income _____

If there has been a change in your employment, was it due to your hand condition? Y_ N_

Are you: Living w/someone_ Living alone_ Married_

Divorced_ Widowed_

Do you have any children? Y_ N_ How old? _____

What are your plans for the future? _____

Can you tell me today's date? _____

Can you tell me were you are right now? _____

Which floor are we on? _____

Can you tell me who is the president now? And before that?

Repeat after me: iceberg, lion, shoe (repeat until learned; note number of trials).

Do Serial 7's (100, 93, 86, 79, 72, 65) OR Serial 3's (30,27, 24, 21, 18, 15); OR: Spell WORLD backwards.

Ask for the three objects. _____, _____, _____

Have patient follow a three-stage command: "Take the paper with your good hand; fold it in half; put it on the bed." 0 1 2 3

What does it mean "No use crying over spilled milk?"_____

_____

And "People who live in glass houses shouldn't throw stones?"

_____

What would you do if you found an envelope that was sealed, addressed, and had a stamp on it?_____

What is the correct thing to do if you are in a packed movie theater and you notice that a fire has started? _____

Have you ever felt like your mind was playing tricks on you? Y_ N_

Have you ever felt that someone wanted to harm you? Y_ N_

That someone was putting ideas in your head? Y_ N_

When you are watching TV, do you ever feel that what they are saying is a special message for you? Y_ N_

Have you ever thought that you were seeing or hearing things that other people could not see or hear? Y_ N_

How do you feel right now? _____

How have you been feeling lately? _____

Have you ever felt like life is not worth living? Y_ N_

How about now? Y_ N_

Have you ever tried to kill yourself? Y_ N_ How many times? ____ How?

_____

Ever felt like harming any one? Y_ N_ How about now? Y_ N_ (Person, plan, weapon?)_____.

APPENDIX A

NRS-11-PAIN INTENSITY

Please tell me the number between 0 and 10 that best describes the severity of the pain you have experienced today.

Zero (0) means "no pain at all" and 10 means "pain as bad as it could be."

Name_____ Date __/__/__ Time ___am/pm

SCORE ___

NRS-11-PAIN AFFECT

Please tell me the number between 0 and 10 that best describes how much you have been bothered by any pain you may have felt today.

Zero (0) means "I haven't felt bothered at all" and 10 means "I have felt as bothered as I could be."

Name _____ Date __/__/__ Time ___am/pm

SCORE ___

APPENDIX A

TREATMENT PROGRESS

Date: __/__/__ Patient's Name: _____

Please circle the number that best describes this patient's progress:

1. No progress
2. Minimal progress
3. Progress somewhat less than expected
4. Progress as expected
5. Progress somewhat better than expected
6. Progress better than expected
7. Progress much better than expected

FOLLOW-UP VISIT DATE: _____ RATING 1 2 3 4 5 6 7

FOLLOW-UP VISIT DATE: _____ RATING 1 2 3 4 5 6 7

APPENDIX A

NRS-II-OBSERVED COMFORT

Date: _____ Patient's Name _____

Please indicate on the line marked SCORE the number between 0 and 10 that best describes how comfortable you thought this patient was during his or her therapy session.

Zero (0) means "This patient did not seem to be comfortable at all" and 10 means "This patient seemed to be extremely comfortable."

SCORE ___

COOPERATION

Please indicate the number that best describes how much cooperation you thought this patient showed during his or her occupational therapy session.

1. No cooperation
2. Minimal cooperation
3. Somewhat less than average cooperation
4. Average cooperation
5. Somewhat greater than average cooperation
6. Greater than average cooperation
7. Much greater than average cooperation

APPENDIX A

NRS-11-PERCEIVED COMFORT

Please tell me the number between 0 and 10 that best describes how comfortable you felt today during your OT session(s).

Zero (0) means "I didn't feel comfortable at all" and 10 means "I felt as comfortable as I could feel."

Name _____

Date __/__/__ Time ___am/pm

SCORE ___

APPENDIX B

MODIFIED RAPID INDUCTION ANALGESIA PROCEDURE

WITH INCORPORATED TART SCALE

APPENDIX B

MODIFIED RAPID INDUCTION ANALGESIA PROCEDURE

WITH INCORPORATED TART SCALE

FOR THE NEXT FEW MINUTES, I'D LIKE TO TEACH YOU HOW YOU CAN FEEL MORE COMFORTABLE AND RELAXED. AT SOME POINT I WILL ASK YOU TO TELL ME, ON A SCALE OF ZERO TO TEN, HOW DEEPLY RELAXED YOU FEEL; ZERO MEANS YOU DO NOT FEEL RELAXED AT ALL, AND TEN MEANS YOU FEEL MORE RELAXED THAN YOU HAVE EVER BEEN. I WONDER IF YOU'D LIKE TO FEEL MORE COMFORTABLE AND RELAXED THAN YOU DO RIGHT NOW....

I'M QUITE SURE THAT IT WILL SEEM TO YOU THAT I HAVE REALLY DONE NOTHING, THAT NOTHING HAS HAPPENED AT ALL. YOU MAY FEEL A BIT MORE RELAXED, IN A MOMENT, BUT I DOUBT THAT YOU'LL NOTICE ANY OTHER CHANGES. I'D LIKE YOU TO NOTICE, THOUGH, IF YOU ARE SURPRISED BY ANYTHING ELSE YOU MIGHT NOTICE.

OK, THEN... THE REALLY BEST WAY TO BEGIN FEELING MORE COMFORTABLE IS TO JUST BEGIN BY MAKING YOURSELF AS COMFORTABLE AS YOU CAN RIGHT NOW.... GO AHEAD AND ADJUST YOURSELF TO THE MOST COMFORTABLE POSITION YOU LIKE.... THAT'S FINE. NOW, I'D LIKE YOU TO NOTICE HOW MUCH MORE COMFORTABLE YOU CAN FEEL BY JUST TAKING ONE VERY BIG, SATISFYING DEEP BREATH. GO AHEAD.... (model breath) BIG, DEEP, SATISFYING BREATH.... THAT'S FINE.

YOU MAY ALREADY NOTICE HOW GOOD THAT FEELS.... HOW WARM YOUR NECK AND SHOULDERS CAN FEEL... NOW, THEN... I'D LIKE YOU TO TAKE A FEW MORE, VERY DEEP, VERY COMFORTABLE BREATHS, ... AND, AS YOU EXHALE, ... NOTICE... JUST NOTICE HOW COMFORTABLE YOUR SHOULDERS CAN BECOME.... AND NOTICE HOW COMFORTABLE YOUR EYES CAN FEEL WHEN THEY CLOSE... AND WHEN THEY CLOSE... JUST LET THEM STAY CLOSED.... THAT'S RIGHT.... JUST NOTICE THAT.... AND NOTICE, TOO, HOW, WHEN YOU EXHALE, YOU CAN JUST FEEL THAT RELAXATION BEGINNING TO SINK IN... GOOD, THAT'S FINE...

NOW, AS YOU CONTINUE BREATHING, NORMALLY,... COMFORTABLY, ALL I'D LIKE YOU TO DO .... IS TO THINK ABOUT A STAIRCASE.... ANY KIND YOU LIKE... WITH 20 STEPS... AND I DON'T KNOW IF YOU WOULD PREFER TO GO UP OR TO GO DOWN THE STEPS.... WHATEVER YOU PREFER IS FINE... NOW, YOU DON'T NEED TO SEE ALL 20 STEPS AT ONCE, YOU CAN SEE ANY OR ALL OF THE STAIRCASE, ANY WAY YOU LIKE.... THAT'S

FINE..... JUST NOTICE YOURSELF, AND THE STAIRCASE, HOW SAFE IT IS, AND THE STEP YOU'RE ON, AND ANY OTHERS YOU LIKE.... HOWEVER YOU SEE IT IS FINE...

NOW, IN A MOMENT, BUT NOT YET, I'M GOING TO BEGIN TO COUNT, OUT LOUD, FROM 1 TO 20... AND, AS YOU MAY ALREADY HAVE GUESSED.... AS I COUNT EACH NUMBER I'D LIKE YOU TO TAKE A STEP ON THAT STAIRCASE, UP OR DOWN... WHICH EVER FEELS RIGHT FOR YOU TO DO.... SEE YOURSELF ON THE STAIRCASE... TAKING ONE STEP FOR EACH NUMBER THAT I COUNT, ... THE LARGER THE NUMBER, THE FARTHER YOU ARE ON THE STAIRCASE .... THE FARTHER YOU ARE ON THE STAIRCASE, THE MORE COMFORTABLE YOU CAN FEEL.... ONE STEP FOR EACH NUMBER... ALL RIGHT, YOU CAN BEGIN TO GET READY... NOW I AM GOING TO BEGIN,...

ONE... ONE STEP ONTO THE STAIRCASE.... TWO... THAT'S FINE..... THREE... AND MAYBE YOU ALREADY NOTICE HOW MUCH MORE RELAXED YOU CAN FEEL.... I WONDER IF THERE ARE PLACES IN YOUR BODY THAT FEEL MORE RELAXED THAN OTHERS... PERHAPS YOUR SHOULDERS FEEL MORE RELAXED THAN YOUR NECK.... PERHAPS YOUR LEGS FEEL MORE RELAXED THAN YOUR ARMS..... I DON'T KNOW... AND IT REALLY DOESN'T MATTER.... ALL THAT MATTERS IS THAT YOU FEEL COMFORTABLE, ... THAT'S ALL.... FOUR... PERHAPS FEELING PLACES IN YOUR BODY BEGINNING TO RELAX.... I WONDER IF THE DEEP, RELAXING, RESTFUL FEELING IN YOUR FOREHEAD IS ALREADY BEGINNING TO SPREAD AND FLOW... DOWN, ACROSS YOUR EYES, DOWN ACROSS YOUR FACE... INTO YOUR MOUTH AND JAW... DOWN THROUGH YOUR NECK... DEEP, RESTFUL...

FIVE... ALREADY BEGINNING, PERHAPS, TO REALLY, REALLY ENJOY YOUR RELAXATION AND COMFORT... SIX... SIX STEPS TOWARDS COMFORT... PERHAPS BEGINNING TO NOTICE THAT ALL THE SOUNDS YOU CAN HEAR CAN BECOME A PART OF YOUR EXPERIENCE OF COMFORT AND RELAXATION.... THAT ANYTHING YOU CAN NOTICE BECOMES A PART OF YOUR EXPERIENCE OF COMFORT AND RELAXATION.... SEVEN.... THAT'S FINE... PERHAPS NOTICING THE RESTFUL, COMFORTABLY RELAXING FEELING SPREADING DOWN INTO YOUR SHOULDERS, INTO YOUR ARMS,... I WONDER IF YOU NOTICE ONE PART OF YOUR BODY FEELING HEAVIER THAN THE REST... PERHAPS YOUR LEFT LEG FEELS A BIT HEAVIER THAN YOUR RIGHT LEG... I DON'T KNOW... PERHAPS THEY BOTH FEEL EQUALLY COMFORTABLY HEAVY... OR IS IT LIGHT? IT REALLY DOESN'T MATTER.... JUST LETTING YOURSELF BECOME MORE AND MORE AWARE OF THAT COMFORTABLE FEELING... EIGHT... PERHAPS NOTICING THAT... EVEN AS YOU RELAX, YOUR HEART SEEMS TO BEAT SOMEWHAT FASTER THAN YOU MIGHT EXPECT, PERHAPS NOTICING THE TINGLING

IN YOUR FINGERS... PERHAPS WONDERING ABOUT THE FLUTTERING OF YOUR HEAVY EYELIDS.... NINE ..... BREATHING COMFORTABLY, SLOWLY, AND DEEPLY.... RESTFUL... NOTICING THAT PLEASANT, RESTFUL, COMFORTABLE RELAXATION JUST SPREADING THROUGH YOUR BODY... TEN..... HALFWAY TO THE END OF THE STAIRCASE.... WONDERING PERHAPS WHAT MIGHT BE HAPPENING... PERHAPS WONDERING IF ANYTHING AT ALL IS HAPPENING... AND YET, KNOWING THAT IT REALLY DOESN'T MATTER.... FEELING SO PLEASANTLY RESTFUL ... JUST CONTINUING TO NOTICE THE GROWING, SPREADING, COMFORTABLE RELAXATION....

ELEVEN.... NOTICING MAYBE THAT AS YOU FEEL INCREASINGLY RELAXED, MORE AND MORE RELAXED, THERE IS ONLY COMFORT .... HEALING,... RESTFUL,... WARM COMFORT.... AS YOU BECOME DEEPER AND DEEPER RELAXED.... TWELVE... I WONDER IF YOU NOTICE HOW EASILY YOU CAN HEAR THE SOUND OF MY VOICE... HOW EASILY YOU CAN UNDERSTAND THE WORDS I SAY... FEELING AT EASE, AND SAFE... THIRTEEN ... FEELING MORE AND MORE THE REAL ENJOYMENT OF THIS RELAXATION AND COMFORT... FOURTEEN... NOTICING PERHAPS THE RESTFUL PLEASANTNESS AS YOUR BODY SEEMS TO MOVE DEEPER AND DEEPER INTO THE RELAXATION, WITH ONLY COMFORT TO NOTICE, AND SAFETY TO ENJOY.... AS THOUGH THE BED HOLDS YOU... PLEASANTLY AND WARMLY.... FIFTEEN... DEEPER AND DEEPER RELAXED... ABSOLUTELY NOTHING AT ALL TO DO... BUT JUST ENJOY YOURSELF... AND ALLOW YOUR BODY TO CONTINUE THE WORK OF HEALING ITSELF.... QUICKLY AND EASILY... BECAUSE YOUR BODY KNOWS EXACTLY WHAT IT NEEDS TO DO.... TO HEAL QUICKLY, COMFORTABLY, COMPLETELY.....

SIXTEEN... WONDERING PERHAPS WHAT TO EXPERIENCE AT THE END OF THE STAIRCASE... AND YET KNOWING HOW MUCH MORE READY YOU ALREADY FEEL TO BECOME DEEPER AND DEEPER RELAXED... MORE AND MORE COMFORTABLE... WITH ONLY COMFORT TO NOTICE, AND SAFETY TO ENJOY... SEVENTEEN... CLOSER AND CLOSER TO THE LAST STEP... PERHAPS FEELING YOUR HEART BEATING A LITTLE FASTER, A LITTLE HARDER.... OR MAY BE IT'S STAYING THE SAME, SLOW AND STEADY.... I DON'T KNOW.... AND IT REALLY DOESN'T MATTER.... ALL THAT MATTERS IS YOUR COMFORT.... AS YOU NOTICE, PERHAPS, A FEELING THAT YOUR ARMS AND LEGS ARE BECOMING MORE CLEARLY COMFORTABLE.... AND YOUR HANDS AND FEET... SO VERY COMFORTABLE.... KNOWING THAT NOTHING REALLY MATTERS... EXCEPT YOUR ENJOYMENT OF YOUR EXPERIENCE OF COMFORTABLE RELAXATION... WITH ONLY COMFORT TO EXPERIENCE AND COMFORT TO ENJOY... EIGHTEEN.... ALMOST TO THE LAST STEP....

WITH ONLY SAFETY AND COMFORT TO ENJOY... AS YOU CONTINUE TO GO DEEPER AND DEEPER RELAXED... COMFORTABLE... SAFE.... RESTFUL... RELAXED.... NOTHING REALLY TO DO.... NO ONE TO PLEASE.... NO ONE TO SATISFY... JUST NOTICE HOW VERY COMFORTABLE AND RELAXED YOU CAN FEEL, AND CONTINUE TO FEEL AS YOU CONTINUE TO BREATHE, SLOWLY AND COMFORTABLY... RESTFULLY... NINETEEN.... ALMOST TO THE LAST STEP ... NOTHING BUT COMFORT... NOTHING BUT PEACEFULNESS AND REST.. AS YOU CONTINUE TO FEEL MORE AND MORE COMFORTABLE... MORE AND MORE RELAXED... MORE AND MORE RESTED... MORE AND MORE COMFORTABLE... JUST NOTICING...

AND NOW... TWENTY... LAST STEP... DEEPLY, DEEPLY RELAXED... AND WITHOUT DISTURBING YOUR COMFORT, JUST NOTICE HOW DEEPLY RELAXED YOU FEEL RIGHT NOW.... ON A SCALE OF ZERO TO TEN.... ZERO MEANS NOT RELAXED AT ALL..... TEN MEANS MORE DEEPLY RELAXED THAN YOU HAVE EVER BEEN.... WHAT NUMBER REPRESENTS HOW RELAXED YOU FEEL RIGHT NOW? PLEASE SAY THAT NUMBER OUT LOUD..... .....

THAT'S RIGHT.... AND YOU CAN GO EVEN DEEPER RELAXED..... DEEPER WITH EVERY BREATH YOU TAKE.... AS I TALK TO YOU ABOUT SOMETHING YOU ALREADY KNOW A LOT ABOUT.... REMEMBERING AND FORGETTING.... EVERY MOMENT OF EVERY DAY WE REMEMBER.... AND THEN WE FORGET, SO WE CAN REMEMBER SOMETHING ELSE... YOU CAN'T REMEMBER EVERYTHING ALL AT ONCE.... SO YOU LET SOME THINGS MOVE QUIETLY TO THE BACK OF YOUR MIND.... I WONDER, FOR EXAMPLE, IF YOU CAN REMEMBER WHAT YOU HAD FOR LUNCH THE LAST TIME YOU HAD LUNCH... YOU CAN PROBABLY REMEMBER WITHOUT MUCH EFFORT... AND YET... I WONDER IF YOU REMEMBER WHAT YOU HAD FOR LUNCH A MONTH AGO TODAY... I WOULD GUESS THE EFFORT IS REALLY TO GREAT TO DIG UP THAT MEMORY, THOUGH, OF COURSE, IT IS THERE, SOMEWHERE.... NO NEED TO REMEMBER, SO YOU DON'T....

AND I WONDER IF YOU'LL BE PLEASED TO NOTICE THAT THE THINGS WE TALK ABOUT TODAY, WITH YOUR EYES CLOSED, ARE THINGS WHICH YOU'LL REMEMBER TOMORROW, OR THE NEXT DAY... OR NEXT WEEK... I WONDER IF YOU'LL DECIDE TO LET THE MEMORY OF THESE THINGS REST QUIETLY IN THE BACK OF YOUR MIND... OR IF YOU'LL REMEMBER GRADUALLY, A BIT AT A TIME.... OR PERHAPS ALL AT ONCE... TO BE AGAIN RESTING IN THE BACK OF YOUR MIND... PERHAPS YOU'LL BE SURPRISED TO NOTICE THAT THE OCCUPATIONAL THERAPY ROOM IS THE PLACE FOR MEMORY TO SURFACE... PERHAPS NOT.... PERHAPS YOU'LL NOTICE THAT IT IS MORE

COMFORTABLE TO REMEMBER IN A DIFFERENT PLACE... ON ANOTHER DAY ALTOGETHER... IT REALLY DOESN'T MATTER... DOESN'T MATTER AT ALL... WHATEVER YOU DO,... WHEREVER YOU CHOOSE TO REMEMBER.... IS JUST FINE.... ABSOLUTELY NATURAL... DOESN'T MATTER AT ALL.... WHETHER YOU REMEMBER TOMORROW OR THE NEXT DAY... WHETHER YOU REMEMBER ALL AT ONCE, OR GRADUALLY... REALLY DOESN'T MATTER AT ALL....

AND TOO, I WONDER IF YOU'LL NOTICE ... WHEN THEY GIVE YOU THE MEDICATION BEFORE GOING TO SURGERY.... THAT IT WILL BE SO EASY FOR YOU TO START A NICE DAYDREAM... FEELING COMFORTABLE AND RELAXED.... READY TO RESPOND WHEN SOMEONE SPEAKS DIRECTLY TO YOU, BUT OTHERWISE ALL SOUNDS CAN BE JUST LIKE PLEASANT MUSIC IN THE BACKGROUND, HELPING YOU TO RELAX EVEN MORE.... AND I WONDER IF YOU'LL BE PLEASED TO NOTICE JUST HOW COMFORTABLE YOU CAN FEEL AFTER THE SURGERY... HOW QUICKLY YOUR APPETITE AND SLEEP CAN RETURN TO THE WAY THEY SHOULD BE... HOW QUICKLY YOUR BODY RECOVERS.... AND YOUR CONDITION RETURNS TO NORMAL... TO THE FULLEST RECOVERY POSSIBLE....I WONDER IF YOU'RE ALREADY AWARE... OF JUST HOW EASY IT IS FOR YOUR BODY TO KNOW EXACTLY WHAT IT NEEDS TO DO... TO PRODUCE THE RIGHT KIND OF CELLS, THE RIGHT KIND OF CHEMICALS,... JUST THE RIGHT TYPE OF TISSUE... SO THAT ALL NECESSARY HEALING CAN TAKE PLACE AS SHOULD BE.... I WONDER IF YOU ALREADY KNOW JUST HOW MUCH FASTER YOUR WOUND CAN HEAL... AND HOW EASILY... QUICKLY... COMFORTABLY... AS IT WAS MEANT TO DO... ALLOWING THE NATURAL ABILITY OF YOUR BODY TO DO THE NECESSARY WORK.... TO FIGHT INFECTION.... YOU CAN SEE HOW THE TISSUES RETURN TO NORMAL.... HEALING COMFORTABLY... EASILY...

I WONDER IF YOU ALREADY KNOW THAT YOU CAN HAVE ALL THE COMFORT YOU NEED... AND IF YOU'LL FEEL SURPRISED THAT YOUR HOSPITAL STAY IS SO MUCH MORE PLEASANT AND COMFORTABLE THAN YOU EXPECTED....

I WONDER IF YOU'LL NOTICE ALL THIS WITH SURPRISE... SURPRISE, CURIOSITY....AND NOTHING FOR YOU TO DO BUT ALLOW IT TO HAPPEN.... JUST ALLOWING YOURSELF TO FEEL AT EASE AND TO FOLLOW THE ADVISE OF YOUR DOCTORS ... AND NURSES... AND THERAPISTS.... REGARDING YOUR TREATMENT.... TO FEEL THE COMFORT OF KNOWING .... THAT YOUR BODY IS WORKING TOGETHER WITH YOUR DOCTORS... AND NURSES... AND THERAPISTS... THAT THEY ARE HELPING YOUR BODY HEAL AS QUICKLY AND SAFELY AS POSSIBLE... I WONDER IF YOU'LL BE PLEASED TO NOTICE THAT TODAY... AND ANY DAY... WHENEVER YOU ARE ASKED TO MOVE YOUR HAND TO PERFORM YOUR EXERCISES,.... WHEN YOU FEEL YOUR HAND GOING INTO POSITION FOR THE

EXERCISES,... OR FOR CLEANING AND DRESSING YOUR WOUND... YOU'LL FEEL REMINDED OF HOW VERY COMFORTABLE YOU'RE FEELING RIGHT NOW... EVEN MORE COMFORTABLE THAN YOU ARE FEELING RIGHT NOW... COMFORTABLE... RELAXED... FEELING ONLY COMFORT.. ONLY COMFORT...

I WONDER IF YOU'LL BE REMINDED OF THIS COMFORT, TOO, AND RELAXATION,... BY JUST NOTICING THE FACE OF THE OCCUPATIONAL THERAPIST... PERHAPS THIS COMFORT AND RELAXATION WILL COME FLOODING BACK, QUICKLY AND AUTOMATICALLY... WHENEVER YOU FIND YOURSELF BEGINNING TO DO YOUR EXERCISES.... I DON'T KNOW EXACTLY HOW IT WILL SEEM... I ONLY KNOW, AS PERHAPS YOU ALSO KNOW.... THAT YOUR EXPERIENCE WILL SEEM SURPRISINGLY MORE PLEASANT, SURPRISINGLY MORE COMFORTABLE, SURPRISINGLY MORE RESTFUL THAN YOU MIGHT EXPECT... PERHAPS FEELING SURPRISED AT JUST HOW COMFORTABLE YOU CAN REALLY FEEL.... AND HOW QUICKLY TIME PASSES WHILE YOU DO YOUR EXERCISES.... LIKE YOU HAVE JUST STARTED AND IT'S ALREADY TIME TO STOP.... WITH ONLY COMFORT TO EXPERIENCE... AND FEELINGS OF RELAXATION... WANTING TO DO THE EXERCISES BECAUSE YOU KNOW HOW MUCH BETTER YOUR HAND WILL FEEL AFTERWARDS... KNOWING THAT WHATEVER YOU FEEL AS YOU DO THE EXERCISES ONLY MEANS HOW MUCH EASIER IT WILL BE FOR YOU TO USE YOUR HAND AFTERWARDS.... KNOWING ALL THE WAYS THAT YOU MIGHT BE USING YOUR HAND AFTER IT'S HEALED.... SEEING YOURSELF USING YOUR HAND... KNOWING THAT EVERYTHING YOU EXPERIENCE CAN BE A PART OF YOUR COMFORT... OF BEING ABSOLUTELY COMFORTABLE... AND ABLE TO USE YOUR HAND... AND I DON'T KNOW IF YOU WILL CHOOSE TO INCREASE YOUR HAND'S ABILITY TO MOVE, OR IF YOU'LL BE SURPRISED AT HOW EASY IT IS TO ALLOW YOUR HAND TO MOVE.... WHEN IT IS APPROPRIATE... LOOSE AND COMFORTABLE... MOVING IT AS MUCH AS IT NEEDS TO, BUT NO MORE THAN THAT... JUST ENOUGH TO ENSURE A FAST, SAFE, COMPLETE RECOVERY...

AND I WANT TO REMIND YOU THAT WHENEVER THE NURSE, OR THE OCCUPATIONAL THERAPIST TOUCH YOUR HAND,.... WHENEVER IT IS APPROPRIATE, AND ONLY WHEN IT IS APPROPRIATE... WHENEVER THE NURSE, OR THE OCCUPATIONAL THERAPIST TOUCH YOUR HAND... YOU'LL EXPERIENCE A FEELING... A FEELING OF BEING READY TO DO SOMETHING.... PERHAPS A FEELING TO BE READY TO TAKE A DEEP, RELAXING BREATH... A FEELING OF BEING READY TO BE EVEN MORE COMFORTABLE... PERHAPS READY TO FEEL EVEN MORE DEEPLY THESE FEELINGS OF COMFORT, AND RELAXATION.. I DON'T KNOW... BUT WHENEVER THE NURSE, OR THE OCCUPATIONAL THERAPIST

TOUCH YOUR HAND... YOU'LL EXPERIENCE A FEELING... OF BEING READY TO BECOME REALLY COMFORTABLE... TO LET THEM DO WHAT THEY NEED TO DO FOR THE CARE OF YOUR HAND... TO DO WHAT YOU NEED TO DO FOR THE CARE OF YOUR HAND.... PERHAPS JUST A FEELING OF BEING SURPRISED AT JUST HOW QUICKLY TIME CAN PASS... OR A FEELING OF BEING READY TO BECOME MORE SURPRISED AT JUST HOW COMFORTABLE YOU CAN FEEL.... OR BOTH... IT REALLY DOESN'T MATTER... NOTHING MATTERS BUT YOUR EXPERIENCE OF COMFORT AND RELAXATION... ABSOLUTELY DEEP COMFORT AND RELAXATION.... ONLY COMFORT AND SAFETY... THAT'S FINE...

AND NOW, AS YOU CONTINUE TO ENJOY YOUR COMFORTABLE RELAXATION.... I'D LIKE YOU TO NOTICE HOW VERY NICE IT FEELS TO BE THIS WAY... TO REALLY ENJOY YOUR OWN EXPERIENCE... TO REALLY ENJOY THE FEELINGS YOUR BODY CAN GIVE YOU.... KNOWING THAT YOU CAN KEEP THIS COMFORT FOR A LONG TIME.... THAT THE BEGINNING OF DISCOMFORT CAN BE A CUE TO REMEMBER JUST HOW COMFORTABLE YOU CAN FEEL... PERHAPS EVEN MORE COMFORTABLE THAN YOU FEEL RIGHT NOW...

AND IN A MOMENT, BUT NOT YET.... NOT UNTIL YOU'RE READY... BUT IN A MOMENT, I'M GOING TO COUNT FROM 20 TO 1... AND AS YOU KNOW, I WANT YOU TO FEEL YOURSELF GOING BACK ON THE STEPS, ... ONE STEP FOR EACH NUMBER... YOU'LL HAVE ALL THE TIME YOU NEED.... AFTER ALL TIME IS RELATIVE... FEEL YOURSELF SLOWLY AND COMFORTABLY GOING BACK ON THE STEPS... ONE STEP FOR EACH NUMBER I COUNT... AND AS WE GET CLOSER TO THE FIRST STEP... YOUR EYES WILL BE ALMOST READY TO OPEN,.... BEGINNING TO FEEL MORE ALERT AND AWAKE.... AND WHEN WE REACH ONE, AND YOU OPEN YOUR EYES, YOU WILL BE ALERT, AWAKE, REFRESHED, ...PERHAPS AS THOUGH YOU HAD A NICE NAP... ALERT, REFRESHED, COMFORTABLE.... AND EVEN THOUGH YOU'LL STILL BE VERY COMFORTABLE AND RELAXED, YOU'LL BE ALERT AND FEELING VERY WELL... PERHAPS SURPRISED, BUT FEELING VERY WELL... PERHAPS READY TO BE SURPRISED..... NO HURRY, YOU'LL HAVE ALL THE TIME YOU NEED... AS YOU BEGIN TO GO BACK THOSE STEPS... TWENTY... NINETEEN... EIGHTEEN... THAT'S RIGHT, FEEL YOURSELF GOING BACK THOSE STEPS... READY TO BE SURPRISED, KNOWING WHAT YOU HAD FOR LUNCH THE LAST TIME YOU HAD LUNCH, AND YET... SEVENTEEN... SIXTEEN... FIFTEEN... A QUARTER OF THE WAY BACK.... MORE AND MORE ALERT... NO RUSH... PLENTY OF TIME.... FEEL YOURSELF BECOMING MORE AND MORE ALERT.... FOURTEEN, THIRTEEN, TWELVE, ELEVEN,... TEN... HALFWAY BACK THOSE

STEPS... MORE AND MORE ALERT... COMFORTABLE AND MORE AND MORE ALERT.... NINE... THAT'S RIGHT, FEEL YOURSELF BECOME MORE AND MORE ALERT... EIGHT... SEVEN... SIX... FIVE... FOUR... THREE... THAT'S RIGHT... TWO.... ONE... WIDE AWAKE, ALERT, RELAXED, REFRESHED... THAT'S FINE... COMFORTABLE, RELAXED, AND ALERT.

Adapted from the Rapid Induction Analgesia procedure by Joseph Barber (1977) and from Bertha Rodgers' pre-surgical preparation suggestions.

APPENDIX C

CERTIFICATION OF PATIENT CONSENT

(Consent form to be typed on C-640 Clinical Research Consent Form)

APPENDIX C

Title: Post-surgical recovery and rehabilitation.

Purpose: We are conducting a study to determine how to best help hand surgery patients recover more comfortably from hand surgery. We want to know if certain procedures can help patients recover faster and cope better with the pain and discomfort associated with recovering from hand surgery. We would like to ask for your help in this investigation.

Procedure: Approximately 60 patients are needed to participate in this study. If you agree to participate, you may be asked to answer some questions about yourself and to participate in relaxation and imagery exercises. You may be given some suggestions to improve your recovery. In addition, you may be asked to answer questions about any feelings of comfort or discomfort you might feel as a consequence of the surgery and of the treatment you will receive. You will be visited in the hospital up to five times by one of the researchers, an advanced Ph.D. student in Counseling Psychology at the University of Miami. The visits will last up to 20 minutes, except for the initial visit which may last up to one hour.

You will receive the standard treatment and may also receive the treatment we are investigating. You have an equal chance to be assigned to either group, but you will not be told which group you were assigned to until after your rehabilitation is completed.

Risks: The type of relaxation used in this study is found by most people to be quite pleasant; most people report feeling very relaxed and refreshed during the exercise and afterwards. On rare occasions, a very small number of people have experienced brief feelings of disorientation, dizziness, anxiety, mild headache, or the need to take a nap. The person conducting the study will be available to discuss your experiences. If you do not receive the new treatment, you might feel more discomfort that if you did, but we cannot say this for sure, since this what we are trying to determine.

Benefits: Your participation in this study may result in faster recovery and less pain, depending on which group you are assigned to. In either case, your level of discomfort after the operation

will be, at the least, no worse than usual; and at the most, it may be so low as to not be bothersome at all. In addition, if the new treatment is found to be useful, it may be offered to other patients undergoing hand surgery in order to alleviate some of the pain and discomfort that often go with having this kind of operation.

Alternatives: You have the alternative not to participate in this study, in which case you are assured of receiving only the standard treatment.

Compensation: You will not be paid for your participation in this study. Participation in this study does not present any physical risk to you except as explained above. In the event that you experience any adverse consequences as a result of this study, treatment will in most cases be available. However, such treatment will be at your expense or the expense of your insurance carrier. Funds to compensate for pain, expenses, lost wages or other damages caused by injury are not routinely available.

Confidentiality: Your consent to participate in this study includes consent for the investigators to review all your medical records as may be necessary for the purposes of the study. The investigators will consider your records confidential to the extent permitted by law. Your name will never be used to report the results of this study; the results of the study will be reported as group averages only.

Right to withdraw: Participation in this study is completely voluntary. You are free to refuse to participate, or to withdraw your participation at any time without fear of any negative consequences. Refusing to participate will in no way affect the quality of the medical care that you are entitled to receive. The surgeon in charge of your care and/or the primary investigator can remove you from the study without your consent either because you fail to follow the study schedule or because removal from the study is thought to be in your best medical interest.

Questions: You are encouraged to ask the investigators any questions you may have concerning the study; however, in order to ensure valid results, questions regarding specific characteristics of

the treatment and questions about group membership will only be fully answered once your rehabilitation has been completed.

If you have questions about the research, you may contact Magaly Mauer at (305) 378-6218; if you have questions about your rights as a research participant, you may contact Maria Arnold at (305) 547-3327.

BY SIGNING THIS FORM, YOU INDICATE THAT YOU HAVE READ AND UNDERSTOOD THIS INFORMATION AND THAT YOU AGREE TO PARTICIPATE.

_____ _____

SIGNATURE OF SUBJECT DATE

_____ _____

SIGNATURE OF WITNESS DATE

APPENDIX D

PARTICIPANT DEBRIEFING

APPENDIX D

PARTICIPANT DEBRIEFING

Mr./Mrs./Ms._____. First, I want to thank you for your participation in this project. I would like to tell you what the research is about. We are comparing a method involving relaxation and therapeutic suggestions (sometimes called medical hypnosis) to the standard treatment received by hand surgery patients. We want to see if the patients receiving the relaxation and suggestion method experience less intense pain, less distress about the pain they experience, and less anxiety. Also, we want to know if patients receiving the new method recover faster from surgery, and require less pain medication. Another thing we want to know is if we can help patients to start moving their hands sooner, and to feel more motivated and more comfortable while doing the OT exercises, so they can have good results without so much pain and discomfort.

You were assigned to the _____ group. We do not know yet if the experimental treatment is effective in any of these areas or not, but if you are interested, I would be happy to send you the results when we are finished analyzing the data.

If you have any questions or comments, I would be happy to talk about them with you now.

VITA

Magaly (Maggie) Hettinga Mauer was born in Bogota, Colombia. Her parents are Mr. Hugo H. Rocha and Mrs. Totty Perez de Rocha. Magaly received her elementary and secondary education in Catholic schools in Colombia and Panama. She emigrated to the United States at the age of 21. Magaly returned to school after raising a family and received her Bachelor's degree in Business Administration in December of 1986.

After graduation, Magaly worked as a Human Resources administrator for Cordis Corporation. She decided to pursue a graduate degree in psychology and was admitted post-baccalaureate to the Doctoral Program in Counseling Psychology at the University of Miami in Coral Gables, Florida. She expects to receive the Doctor of Philosophy degree from that institution in December, 1994.

Magaly lives in Miami. She is married to Frederick Joseph Mauer and has two sons, Alle and Hugo Hettinga, and three grandchildren, Natalia Gabriela and Karina Andrea Hettinga-Costa, and Alle Geert Hettinga-Cabeza.

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