

Proposal for a Thesis  
in the Field of Psychology  
in Partial Fulfillment of Requirements for  
the Master of Liberal Arts Degree

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Extension School

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## I.

## Tentative Title

I propose to title my thesis Using Psychological Screening to Predict Surgical Outcomes  
in Chronic Pain Patients

## II.

## Research Problem

Can psychological screening instruments be used to predict surgical outcomes for patients implanted with a spinal cord stimulator (SCS)? The ability to predict patient outcomes will lead to better patient selection for the procedure and improved patient satisfaction scores from SCS implantation (Burchiel et al., 1995). Daniel, Long, Hutcherson, and Hunter (1985) reported that successful SCS patient-reported outcomes range from twenty-five to eighty-eight percent. Successful outcomes are defined by at least a fifty percent reduction in pain (Barolat, 1999; LeDoux & Langford, 1993). According to more recent literature, long-term successful outcomes are reported to be between forty and eighty percent (Bennett, Alo, Oakley, & Feler, 1999; De La Porte & Van de Kelft, 1993; North, Ewend, Lawton, Kidd, & Piantadosi, 1991; North, Kidd, James, & Long, 1993). The disparity in outcome data and the mediocre levels of reported successful outcomes demonstrate the need for a means of identifying which patients are most likely to receive long-term benefit from this modality. Therefore, the purpose of this study is to prove that psychological screening can predict long-term outcomes in chronic pain patients.

Implanted stimulators produce electrical stimulation over the spinal cord to block neurotransmissions traveling from chronic pain areas to the brain (LeDoux & Langford, 1993). Blocking the neurotransmissions in the spinal cord can alleviate complex chronic neuropathic pain (North & Guarino, 1999). Even though LeDoux and Langford (1993) found that a significant number of patients implanted with a SCS device experienced prolonged and significant pain relief, success is not universal (De La Porte & Van de Kelft, 1993).

According to Ashburn and Staats (1997), chronic pain patients often have complex psychological and physical needs, which require care from a multidisciplinary pain clinic. Psychologist and physicians often must determine if the chronic pain is the cause of the psychological distress or the effect. For example, a chronic pain patient may have had several surgical procedures, take a variety of oral pain relievers and receive psychological assistance for the mental stress and possible depression associated with the chronic pain (Daniel, et al. 1985; Linton, 2000; Romano & Turner, 1985; Sadigh, 1998).

Despite general acceptance among both pain psychologist and pain management physicians who treat these patients that psychological factors contribute to the effectiveness of SCS treatment, the literature on the use of psychological screening to predict outcomes for SCS is scarce and conflicting (Daniel et al., 1985; Burchiel et al., 1995; North et al., 1996). Therefore, the proposed study will use regression analysis to determine the predictive quality of two psychological screening instruments. Social and family support, patient functioning, pain severity and self-control will be measured using the Multidimensional Pain Inventory (MPI). The Beck Depression Inventory (BDI) will be used to test for depressed mood. The proposed study is needed to eliminate the

confusion and to establish the psychological dimensions that will enable clinicians to predict SCS outcome

### III.

#### Definition of Terms

Chronic pain : is defined by Ashburn and Staats (1999) as pain that persists past the normal healing process or pain associated with progressive non-malignant disease (p. 1865). Furthermore, Ashburn and Staats (1999) explain that, Patients with chronic pain commonly experience depression, sleep disturbance, fatigue, and decreased overall physical and mental functioning (p. 1865).

Spinal cord stimulators : are implanted devices used to produce electrical stimulation over the spinal cord for relief of complex chronic pain conditions. Although the actual mechanisms of SCS are widely debated and beyond the scope of this definition (Linderoth & Foreman, 1999), SCS replaces pain responses with a tingling sensation.

Multidisciplinary pain clinics : offer comprehensive treatment for patients suffering from chronic pain (Flor, Fydrich, & Turk, 1992). Physicians, psychologists, physical therapists, nurses and other caregivers work together to alleviate chronic pain, physical disability and emotional distress (Ashburn & Staats, 1999; Becker, Sjogren, Bech, Olsen, & Eriksen, 2000).

Neuropathic pain : is defined by Oakley (1999) as persistent pain generated by injury to the peripheral, central or autonomic nervous system (p. 184). Whereas, nociceptive or acute pain and cancer pain are normal responses to tissue damage and usually resolve after the healing process is complete (Ashburn & Staats, 2000). Spinal cord stimulation

is a well-established method of treating complex neuropathic pain conditions (North & Guarino, 1999).

#### IV.

##### Background of the Problem

According to Ashburn and Staats (1999), Patients with chronic pain commonly experience depression, sleep disturbance, fatigue and decreased overall physical and mental functioning (p. 1865). Gamsa (1990) reports that a significant portion of the chronic pain population suffers from depression and an unhealthy social and family environment. Although the debate over the cause and effect relationship between psychological distress and chronic pain is without clear resolution, the literature shows that psychological distress is unusually high among the chronic pain population (Romano & Turner, 1985; Jamison & Virts, 1990; Haythornwaite, Sieber, & Kerns, 1991; Banks & Kerns, 1996; Feldman, Downey, & Schaffer-Neitz, 1999).

Depression, a poor social environment and an unhealthy family environment can affect surgical outcomes (Daniel et al., 1985; Weinryb, Gustavsson, & Barber, 1997).

According to North et al. (1996), treatment of affective disorders may be a prerequisite to effective pain management (p. 308). Daniel et al. (1985) state that:

Many chronic pain patients have personality disorders, drug dependence, unstable family and personal relationships, or poor vocational adjustment; in addition, litigation or compensation is frequently involved. All of these variables maintain and exacerbate chronic pain and preclude the effectiveness of stimulation. Therefore, it is important to assess [psychological] variables for chronic pain patients who are candidates for electrode implantation. (p. 776).

Although the literature advocates psychological screening, there is limited science demonstrating how psychological assessments can be used to qualify patients that will benefit from SCS implantation.

Psychological instruments have been shown to identify psychological factors in the chronic pain population (Feldman, Downey, & Schaffer-Neitz, 1999; Gasma, 1990; Jamison & Virts, 1990; Magni, Moreschi, Rigatti-Luchini, & Merskey, 1994). In addition, the literature has demonstrated the efficacy of SCS therapy for the treatment of complex chronic pain conditions (De La Porte & Van de Kelft, 1993, LeDoux & Langford, 1993). However, only three articles were found that attempted to utilize psychological assessment to predict SCS outcomes. A review of this literature serves as the foundation for this project.

Although Daniel et al. (1985) were able to use psychological tests to predict outcomes in seventy six and a half percent of patients implanted with a spinal cord stimulator, the criteria for predicting outcomes is not clearly defined. While this study demonstrates that psychological screening can help clinicians predict SCS outcomes, there are no details about how actual scores convinced the researchers of a particular outcome.

A study by Burchiel et al. (1995) followed the patients for three months, using psychological screening to accurately predict surgical outcomes in eighty-eight percent of the patients implanted with SCS. Regression analysis found that the MMPI depression sub-scale D, the evaluative sub-scale of the MPQ and patient age were found to be predictive of pain reduction after three months of SCS implantation. Burchiel et al. (1995) found that, younger patients who are less depressed are more likely to receive

good relief from SCS (p. 1108). Furthermore, Burchiel et al. (1995) reported, that patients who consider their overall pain experience to be more intense are more likely to report larger improvements in [VAS] pain level after 3 months of stimulation (p. 1108). However, the Burchiel et al. (1995) study concludes by expressing a need for future studies to determine if screening for psychological factors can enable clinicians to predict SCS outcomes. Unfortunately, no subsequent studies have been published to substantiate these findings.

North et al. (1996) used univariate and multivariate statistical analysis to test the association between treatment outcomes, preoperative test scores, and clinical variables (p. 301). Prior to implantation of a spinal cord stimulator, patients were asked to complete the MMPI with Wiggins content scales, Symptom Check List-90, and Derogatis Affects Balance Scale (DABS). The conclusion by North et al. (1996) states that the battery of psychological tests fail to explain most of the observed variance in success or failure of treatment with SCS (p. 308).

Current literature contains subjective criteria to predict outcomes, small sample sizes, short follow-up periods for data collection, and conflicting reports over the value of psychological screening. The proposed study will increase the sample size from nineteen patients to forty-one patients. The follow-up period will be between twelve months and eighteen months. In addition, rather than using psychological screening to produce subjective clinical predictions, the psychological screening instruments will be used to predict pain reduction after implantation of a stimulator.

## V.

## Research Methods

Subjects

The study sample consists of patients implanted with a spinal cord stimulator at three multidisciplinary pain management clinics in Houston, Texas. The sample is comprised of twenty-two males and nineteen females between the ages of forty-two and seventy-five. All patients experienced chronic pain symptoms for a period of six months or longer with a pain-duration-mean of fifteen months prior to SCS implantation. All patients in the study either have nerve damage or a nervous disorder causing chronic neuropathic pain in the trunk and limbs.

Instruments

The Multidimensional Pain Inventory (MPI) is a sixty-one item self report psychological screening instrument that places patients into one of three distinct psychological profiles (Turk & Rudy, 1990). The MPI contains twenty-eight questions about the pain experience, fourteen questions concerning responses from spouse or significant other and nineteen questions about social and daily activities. For each question, patients are asked to circle a number from zero for no pain or extremely low pain levels to six for very intense pain or very often. The MPI profiles are Dysfunctional (DYS), Adaptive Copers (AC) and Interpersonally Distressed (ID) (Turk & Rudy, 1988). Zaza et al. (2000) explains, DYS patients are characterized by high levels of pain,

affective distress, activity interference, and low levels of perceived control and activity. ID patients are similar to the DYS patients but report low levels of social support. Walter & Brannon (1991) explain that patients classified as AC report lower levels of pain severity, lower interference in their lives, and lower affective distress (p. 476). Patients that do not statistically fall into one of the three MPI profiles will be excluded from the study.

The MPI has been shown to produce valid and reliable subgroups of chronic pain patients based on psychosocial, behavioral and physical responses (Bergstrom, Bodin, Jensen, Linton, & Nygren, 2001; Walter & Brannon, 1991; Zaza et al 2000). Zaza et al. (2000) points out that, the MPI-based classification system incorporates cognitive, affective and behavior factors, and was empirically derived from, and validated on, various non-malignant pain populations (p. 75).

The Beck Depression Inventory (BDI) consists of twenty-one groups of items that assess both the cognitive/affective and neurovegetative/[somatic] symptoms of depression (Geisser, Roth, & Robinson, 1997). Patients are asked to circle the statement that best explains how they are currently feeling and have felt over the past week. Each item is scored from zero for neutral endorsement to three for absolute or severe endorsement (Williams & Richardson, 1993). Neutral statements (e.g., I do not feel sad) are scored zero, while severe statements (e.g., I am so sad I can't stand it) are scored three points (Williams & Richardson, 1993). Scores above ten indicate mild depressed mood, scores above nineteen indicate moderate to severe depression and scores above thirty signal severe depression (Beck, Steer, & Garbin, 1988).

The BDI has been shown to be a valid instrument for assessing depression in the chronic pain population (Geisser, Roth, & Robinson, 1997; Wesley, Gatchel, Garofalo, & Polatin, 1999). The items on the BDI were originally drawn from depressed patients in treatment, standardized on psychiatric patients, and validated against psychiatric standards to measure the severity of depression (Williams & Richardson, 1993). The neurovegetative/somatic items on the BDI that are considered indicators of depressed mood (e.g., sleep disturbance, fatigue, and low libido levels) appear to be close to normal complaints from chronic pain patients (Williams & Richardson, 1993). However, a more recent study by Geisser, Roth, & Robinson (1997) found that when using the BDI, somatic symptoms of depression did not appear to confound the diagnosis of depression (p.169). In fact, removing the somatic items from the BDI actually decreased the accuracy of classification. (Geisser, Roth, & Robinson, 1997)

The McGill Pain Questionnaire (MPQ) word list consists of 20 groups of words with two to six words in each group. The intensity and severity of the pain descriptor increases as the numbers increase in each group of words. For example, in group five pinching is given a weight of one and crushing is given a score of five. Patients are instructed to only circle words that best describe their pain. All words and groups that do not describe their pain experience should be left blank. Scores can range from zero for no pain to a maximum score of seventy-five with all twenty groups circled for severe pain.

According to Pearce and Morely (1989), Validation of the MPQ has been achieved with classical psychometric correlational methods (p. 115). Kremer and Atkinson (1981) found that in addition to solid face validity the McGill Pain

Questionnaire appears to have good construct validity (p. 98). Studies show that the affective dimensions of the MPQ reflect the affective condition of the chronic pain patient (Kremer & Atkinson, 1981; Pearce & Morely, 1989; Masedo & Esteve, 2000).

### Design

Multiple linear regression will be used to determine if psychological assessments can predict pain reduction scores twelve to eighteen months after the implant of a spinal cord stimulator. Scores from the MPI and the BDI that determine the patient's level of depressed mood, life control, function, and social and family support will be tested against self-reported pain scores from the MPQ.

### Procedure

Approximately four weeks prior to the implantation of a SCS device, forty-one consecutive chronic pain patients were asked to complete the Beck Depression Inventory (BDI) to test for depressed mood. In addition, the Multidimensional Pain Inventory (MPI) was administered to place patients into subgroups based on psychological responses. The screening instruments were administered and scored by a psychologist with a board certification from the American Academy of Pain Management. The psychologist had no prior knowledge of this study. The pain level of each patient was tested prior to surgery and will be monitored at six-month intervals following the procedure using the McGill Pain Questionnaire (MPQ) Word List.

Informed consent is obtained during the screening process to track and monitor the success of patients with implanted devices. The patients are seen for follow-up in the

clinic several times during the first month. Then, the patients return for follow-up visits with the physician and psychologist every six months. Data collected between twelve and eighteen months after surgery will be used for this study. The Windows version of the Statistical Package for Social Sciences will be used to perform the regression analysis.

## VI.

### Research Limitations

The reliance upon self-report data from patients is one limitation of this proposed study (Robinson, Myers, Sadler, Riley, Kvaal, & Geisser, 1997). Chronic pain patients may suffer from personality disorders, depression, and drug dependence (Sadigh, 1998; Magni et al., 1994). In addition, Robinson et al. (1997) show that chronic pain patients may have financial and other reasons to minimize or exaggerate psychological disturbance (p. 74). Robinson et al. (1997) explains that there are several potentially conflicting motivational factors influencing performance [on self-report questionnaires] (p.75). These [factors] include, worker s compensation and pension evaluations, veterans and social security compensation and pension evaluations, active or planned litigation, and medication recommendations (Robinson et al., 1997, p.75). Therefore, the reliability of the self-reported data could be questioned. However, a psychologist familiar with the patients and the psychological screening instruments has analyzed all of the data for inconsistent responses.

This study is limited to forty-one (41) patients in the Houston, Texas metropolitan area. To determine if the finding of this study represent the chronic pain population, a

national multi-center study should be done to substantiate the generalizability of these finding. In addition, population factors such as age, gender, pain severity, length of time since injury occurred, and type of insurance may reveal other significant factors that affect surgical outcomes (Daniel et al., 1985).

Future studies should include Quality of Life (QOL) data in the post-surgical outcome measures. Pain measures and QOL measures will enable clinicians to determine pain reduction and overall satisfaction with the procedure (Matsunaga, Sakou, Arishima, Koga, Hayashi, & Komiya, 2001; Patrick, Deyo, Atlas, Singer, Chapin, & Keller, 1995; Slosar, Reynolds, Schofferman, Goldthwaite, White, & Keaney, 2000).

The proposed study is looking for the predictive quality of psychological assessments. For greater clinical benefit, future studies should determine cut-off scores on certain psychological instruments that indicate which patients would benefit from a spinal cord stimulator implant.

## VII.

### Tentative Schedule

Initial submission of proposal	. June 27, 2001
Proposal returned for revision	. .July 25, 2001
Submission of proposal for final revision	.. .... September 13, 2001
Proposal accepted by research advisor	.. . October 12, 2001
Thesis director assigned	. October 30, 2001
First draft completed	.. .....January 20, 2002
Thesis director returns corrected first draft	..February 20, 2002

Revised draft completed ... March 10, 2002

Thesis director returns revised draft .....April 5, 2002

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Bound copy approved . .May 15, 2002

Graduation ... .June, 2002

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