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Improving Psychological Pre-Surgical Evaluations for Chronic Back Pain by Linking Data of Pre-SurgicalMMPI-2-RF and Post Surgical Pain Interference on Emotional and Physical Functioning

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"Improving Psychological Pre-Surgical Evaluations for Chronic Back Pain by Linking Data of Pre-Surgical MMPI-2-RF and Post-Surgical Pain Interference on Emotional and Physical Functioning."

By

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Abstract

Chronic pain is running rampant, and its treatment options can sometimes be more dangerous than the pain itself. With such a widespread prevalence – and chronic in the name - numerous individuals are left to deal with daily anguish that fails to abate. This Honors Thesis examines a sample of patients presenting with chronic pain and attempts to validate previous research investigating what factors determine candidacy for a possible treatment, dorsal column spinal stimulator surgery. Research supports that this treatment may have beneficial effects, but patients are sometimes unable to gain respite, despite having a stimulator implanted into their lower back. Archival data MMPI-2-RF data from a sample of 39 patients previously screened for their spinal stimulator surgical candidacy, along with post-surgical pain interference on emotional and physical functioning data obtained by having these patients complete a Google form containing Pain and Spinal Surgery Evaluation Survey (PASSS) and OSWESTRY questionnaires, were statistically analyzed via one-way ANOVA and comparison of means tests, and relationships between pre-surgical and post-surgical data were determined. SCS surgical patients who had better (lower) MMPI-2-RF scores relating to regulatory ability of emotion, anger, self-doubt, and other factors, were more likely to have pain reduction than their worse (higher) scoring counterparts, and higher happiness and lower depression values on the PASSS. In addition, surgical patients regardless of pain management outcome reported having less pain,

overall interference of pain, depression, nervousness, anger, irritableness, and fear, when compared to patients who did not have surgery. Though surgical and non-surgical patients reported similar functional disturbance from their pain. Thus, it seems that for this specific sample, surgical patients feel more positive about their pain and its current management than non-surgical patients yet are not better off than non-surgical patients in terms of daily physical functioning.

Introduction to Chronic Pain

Chronic pain is a common occurrence around the world. A meta-analysis conducted by the International Association for the Study of Pain found that "[Chronic pain] estimates range from 10.1% to 55.2%," and the National Pain Strategy, a group formed to pinpoint the prevalence of chronic pain and high-impact chronic pain (a type of chronic pain that restricts life and work activity for the majority of the past six months), notes that 20.4% of U.S. adults were estimated to be afflicted by chronic pain during 2016 (Carr, 2003; Dahlhamer, 2018). This type of pain is defined as "pain that lasts or recurs for more than three months" and includes the following: fibromyalgia (a syndrome plaguing the soft tissue and muscles), shingles (a viral infection that causes pain and rashes, originating from the chickenpox virus), previous injuries, or any of numerous disorders or varieties of nerve damage (IASP, 2019). Individuals dealing with chronic pain often gain respite by taking painkillers such as opioids. Because opioids have become a common solution for managing chronic pain, a greater quantity of individuals have become addicted to them. Opioid addiction brings forth thousands of deaths, and millions of addicted individuals. A startling two million people had an opioid use disorder and 10.3 million people at or under the age of 12 misused opioids in 2018, signaling that other methods for managing chronic pain should be pursued (SAMHSA, 2018). Further, individuals who have mental illness and are stricken by chronic pain may experience greater issues with opioid use (Rogers et al., 2021).

Back Pain and Pain Management

Seemingly more prevalent than chronic pain in general, back pain is pervasive in the U.S., with roughly 70% of the population experiencing back pain throughout their lifetime (Fordyce, Brockway, & Spengler, 1986; Epker & Block, 2001). Contrary to what one might

expect, such as workplace or car accidents, pain in the lower back holds second place in the world for causing disability (Lee et al., 2017; Andersson, 1999). In addition, common non-interventional methods of treatment are medication and physical therapy; a small minority (1%) of individuals reporting back pain require surgery as treatment (Deyo, Diehl, & Rosenthan, 1986; Epker & Block, 2001). Recent research indicates that an unorthodox treatment – cannabis - also exists for reducing symptoms of chronic pain and improving pain ratings, but more research should be conducted to verify its efficacy and inform future medical use (Gruber et al., 2021). The OSWESTRY Disability Index is a scale often applied to measure lower-back pain effect on disability and is concluded to be reliable and valid for this purpose; thus, it was used as a measure of pain interference on physical functioning in this study (Sheahan, Nelson-Wong & Fischer, 2015; Lee et al., 2017).

Surgical Chronic Pain Management

One possible way for managing chronic pain in the lower back and legs, is dorsal column spinal stimulator surgery. This surgery implants a device, a spinal cord stimulator consisting of electrodes and a battery, into the back of a patient. As detailed by Hopkins Medicine, "The electrodes are placed between the spinal cord and the vertebrae, and the generator is placed under the skin, usually near the buttocks or abdomen." This device blocks pain signals from reaching the brain by sending electrical impulses into the spine, cancelling out the pain signals before they have a chance to travel too far up the spine, reaching the brain and thus causing pain to the patient. The device is operated via a remote device controlled by the patient, during times when they experience pain. There are multiple types of spinal stimulators: Rechargeable IPGs (Implantable pulse generators), radiofrequency stimulators, and conventional IPGs. Depending upon the quality of the pain experienced by the patient, the most appropriate type of stimulator

will be surgically implanted. Turner and colleagues (1995) conducted a study finding that "approximately 50 to 60% of patients with failed back surgery syndrome report at least 50% pain relief with SCS at long-term follow-up visits." In combining the literature from Hopkins Medicine and Turner, we can gain a basic understanding of how and if spinal column stimulators work to manage chronic pain.

While the literature supports SCS surgery as an effective intervention for chronic pain, in the Turner et al. (1995)'s study reported that 40 to 50% of patients did not have success managing their chronic pain after SCS. These outcomes could potentially be improved with better selection of candidates prior to surgery to maximize the surgery's success. One way of doing this is utilizing pre-surgical psychological evaluations to identify who should not be a candidate for surgery. Priscilla De La Cruz (2015) conducted a study where BMI, workers' compensation status, smoking, depression, and random drug screen results were correlated to the success of the surgery for 57 post-operative patients. The success of the surgery was denoted by a patient-given score of 5 or higher on a Global Outcome Ratings scale from 1 to 10, "with 5 being 50% improvement at six months post-operation." These ratings were obtained by two separate providers who met with these patients and were "asked to independently grade the patient's outcome in a blinded fashion." De La Cruz found that drug use, specifically tobacco, correlated with a lower success for the SCS (spinal column stimulator) surgery. The other factors such as BMI and workers' compensation status were not shown to be correlated with the success of the surgery. From De La Cruz's study, we can conclude that physical characteristics of prospective patients may be useful for discriminating between individuals who should have the surgery done (as someone who smokes may have a worse outcome as previously detailed).

Using MMPI-2-RF Data to Determine Surgical Candidacy

While demographic data are useful for evaluating prospective patients, the demographic categories examined by De La Cruz likely have an underlying behavioral component. As such, clinicians may be able to better predict surgical outcomes using more precise behavioral data. As noted by Epker & Block (2001), because pain is experienced subjectively, physical treatments may not always be effective, and a psychological perspective should be taken to identify factors relating to poor surgical outcomes. Three psychosocial categories of risk factors identified as affecting surgical outcome are personality/emotional, cognitive/behavioral, and environmental/historical. To apply these factors to determining surgical candidacy, psychological measures should be used (Epker & Block, 2001). Supporting this statement, evidence that medical procedure outcome can be predicted by psychosocial variables, and Bruns and Disorbio (2009) describe that the Brief Battery for Health Improvement 2 can identify risk factors for spinal surgery – though this is not the only test that can do so. One commonly used measure of personality and psychopathology able to be used for this purpose is the Minnesota Multiphasic Personality Inventory-2 (MMPI-2; Drayton, 2009). Drayton describes the MMPI-2 as a test that assesses the mental health of the test-taker, such as depression, anxiety, and trauma symptoms. The test also measures personality characteristics and traits such as "anger, somatization, and hypochondriasis" (Drayton, 2009). The test can also accurately discriminate between genuine and malingered pain (Bianchini et al., 2017).

Researchers continue to investigate whether the data obtained by the MMPI-2 test can help choose candidates who may have a better chance at pain-management with the SCS surgery. Ryan Marek's (2020) work suggests that the MMPI-2 test may separate between excellent and poor candidates for SCS surgery and help direct treatment interventions. Additionally, Epker and

Block (2001) detailed that elevated outliers on the MMPI may exist for those with chronic pain and might be used to identify candidates for SCS, and more specifically, that hypochondriasis, hysteria, depression, psychopathic deviant, anger, and psychasthenia scales predict poor outcomes for SCS. This is supported by research done by Block (2017), who found that higher scores for MMPI-2 scales related to emotion dysregulation, somatization, and interpersonal issues" correlated with worse outcomes for SCS along with poorer patient satisfaction. Rogers et al. (2021) have also shown that emotion dysregulation – related to mood and anxiety symptoms and disorders – is also associated with opioid issues. A difficulty in treating chronic pain with spinal stimulators is elucidated by Solberg, Roach, and Segerstrom (2009), who found that self-regulatory ability is crucial in dealing with chronic pain, and this pain itself may tax self-regulatory abilities, further hindering treatment in the future. Thus, SCS surgery may prove ineffective for those whose ability to self-regulate is hindered. In another study, Block shows that multiple factors were correlated with poorer results for SCS surgery, including "feelings of being overwhelmed, highly distressed, and dissatisfied with life, in addition to an inability to experience positive emotions, higher levels of anxiety and anger, and lack of self-confidence" (Block, 2013). This further supports Epker and Block (2001), because these feelings directly relate to the scales associated with poor surgical outcome. It appears that in general, individuals who have been resilient and avoided allowing their pain to affect their outlook on the world, will have greater pain management following surgery. According to Block, individuals without symptoms of depression or other negative outlooks found on the MMPI-2 test, had greater success with SCS surgery, and exhibited greater reductions in pain and disability as a result of surgery. Supplementing the research done by Block and Marek, Raquelle Ilyse Mesholam (1999) conducted a study where the West Haven-Yale Multidimensional Pain Inventory (MPI)

was used along with the MMPI-2 as a predictor for the success of SCS surgery. Mesholam found that the MMPI-2 and MPI test both "significantly discriminated between patients whose trial implants were failures and those whose trial implants were successful, with response style and the Negative Mood scale from the MPI being the most significant contributors to accurate classification." We see here again that a negative mood and life-outlook, probably caused by the individual being overwhelmed by chronic pain, influences the success of the surgery. From these data, we can also see that not only physical attributes of the patient, but mental attributes as well greatly predicts their success for SCS surgery.

Purpose

The purpose of this research is to examine and identify relationships between pre-surgical MMPI-2-RF evaluation data and follow-up data pain measure data for a set of 39 patients who were previously evaluated to identify candidacy for SCS surgery. This study has three objectives: to verify whether scales of the MMPI-2-RF can determine SCS surgical candidacy, to identify the impact of SCS surgery on chronic pain, and to identify other factors affecting SCS surgical candidacy or the effectiveness of spinal stimulators.

Hypotheses

After reviewing relevant research, it is hypothesized that:

1. Patients with fewer symptoms of negative disorders or behavior will be more likely than those with these symptoms to report successful pain management from their surgery.
2. MMPI-2-RF data indicating symptoms of negative disorders of behavior – described in the literature review as being predictive of poor surgical outcome – will accurately predict surgical outcome – whether or not the pain is managed to any extent.

Participants

Participants of the study were former patients of clinical psychologist Jake Epker, Ph.D., and were selected for the study by contacting all 363 patients who came to Dr. Epker between 2010 and 2018 for pre-surgical evaluations for SCS surgery via phone call, and the 39 patients (of the small quantity whose contact information was correct after multiple years since their evaluation had passed) who indicated that they were willing to participate, were included in this research, yielding a 10.7% participation rate. They ranged from age 29 to 78, 23 were female, the remaining 16 were male, and most lived in the southeastern United States during the time of their evaluation. Of the 39 participants, the 25 who had surgery were assigned to the surgical group, while the 14 who did not were assigned to the non-surgical group. Further, for surgical-group patients, they were separated into two further groups, being the *surgical success* or *surgical failure* group, depending on whether the difference between their pre-surgical reported average pain score and post-surgical current pain score was positive or negative, with positive values for the surgical success group, and negative values or values of zero for the surgical failure group. Participation was purely voluntary, and no incentive was given to prompt participation; participants were simply called via phone, asked whether they had surgery or not, and whether they would like to participate by completing an emailed Google form where their identities were hidden behind randomized ID numbers.

Procedure

Pre-Surgical Data Collection

Between the years of 2010 and 2018, the 39 patients underwent a psychological pre-surgical evaluation for potential spinal stimulator surgery, and each completed the MMPI-2-RF, reported their average pain level between one and ten, and completed other tests not analyzed or discussed in this study, like the Brief Battery for Health Improvement-2.

Post-Surgical Data Collection

Between summer of 2020 and spring and fall of 2021, patients were contacted via the telephone number reported in their individual evaluation paperwork and asked whether they would be willing to participate in this study investigating the impact of spinal column stimulators on pain reduction and other factors. Each of the 39 patients who agreed to participate and had up-to-date contact information provided their email or mailing address over the phone call, and were sent an email from a private, secure email of Dr. Epker's office designated for this research, where a Google form link was attached, which included both the PASSS and OSWESTRY questionnaires, or a paper copy of both questionnaires; the patients also entered their ID number (determined before any phone calls were made), ensuring confidentiality during data collection. During later statistical analysis, pre- and post-surgical data were matched together via their corresponding ID numbers.

Measures

Minnesota-Multiphasic-Personality-Inventory-2-Restructured-Form

The Minnesota-Multiphasic-Personality-Inventory-2-Restructured Form is a 338-item test comprised of 51 individual scales (*MMPI-2-RF Scales*, n.d.). The test is used in the criminal and civil justice systems to determine candidacy to stand trial, in counseling assessments for college, marriage, and family, and is also utilized when determining the extent of dysfunction in spinal cord stimulator, bariatric, and spine surgery candidates, and for chronic pain patients. For future reference. The MMPI-2-RF is broken into validity indicators and scales of higher-order, restructured clinical, somatic/cognitive, internalizing, externalizing, interpersonal, interest, and personality psychopathology five (PSY-5). Names for the scales for future interpretation are as follows: Cannot Say (CNS), Variable Response Inconsistency (VRIN-r), True Response Inconsistency (TRIN-r), Infrequent Responses (F-r), Infrequent Psychopathology Responses (Fp-r), Infrequent Somatic Responses (Fs), Symptom Validity (FBS-r), Response Bias (RBS), Uncommon Virtues (L-r), Adjustment Validity (K-r), Emotional/Internalizing Dysfunction (EID), Thought Dysfunction (THD), Behavioral/Externalizing Dysfunction (BXD), Demoralization (RCd), Somatic Complaints (RC1), Low Positive Emotions (RC2), Cynicism (RC3), Antisocial Behavior (RC4), Ideas of Persecution (RC6), Dysfunctional Negative Emotions (RC7), Aberrant Experiences (RC8), Hypomanic Activation (RC9), Malaise (MLS), Gastro-Intestinal Complaints (GIC), Head Pain Complaints (HPC), Neurological Complaints (NUC), Cognitive Complaints (COG), Suicidal/Death Ideation (SUI), Helplessness/Hopelessness (HLP), Self-Doubt (SFD), Inefficacy (NFC), Stress/Worry (STW), Anxiety (AXY), Anger Proneness (ANP), Behavior-Restricting Fears (BRF), Multiple Specific Fears (MSF), Juvenile Conduct Problems (JCP), Substance Abuse (SUB), Aggression (AGG), Activation (ACT),

Family Problems (FML), Interpersonal Passivity (IPP), Social Avoidance (SAV), Shyness (SHY), Disaffiliativeness (DSF), Aesthetic-Literary Interests (AES), Mechanical-Physical Interests (MEC), Aggressiveness-Revised (AGGR-r), Psychoticism-Revised (PSYC-r), Disconstraint-Revised (DISC-r), Negative Emotionality/Neuroticism-Revised (NEGE-r), and Introversion/Low Positive Emotionality-Revised (INTR-r).

OSWESTRY Disability Index

The OSWESTRY Disability Index is a questionnaire often used for measuring the extent of disability in those with low back pain. Evidence supports that this test can "reliably detect improvement or worsening in most subjects," and is an effective tool utilized for those with "persistent severe disability," being chronic pain in this study. (Davidson & Keating, 2002; Davies & Nitz, 2009). This questionnaire has ten sections: Pain Intensity, Personal Care, Lifting, Walking, Sitting, Standing, Sleeping, Sex Life, Social Life, and Travelling. Each section has six possible answer choices – which are scaled from 0 to 5 – and each choice details the degree to which pain hinders a patient's physical functioning, often using a quantitative value, such as hours an activity can be performed, or distance travelled. For example, answer choices for the Standing section range from standing without extra pain, with extra pain, pain prevents the patient from standing more than one hour, for more than half an hour, for more than ten minutes, or that pain prevents the patient from standing at all. This test allows for the degree that pain affects the research participants' physical functioning to be measured, and for the efficacy of spinal stimulator surgery for the patient pool to be evaluated.

Pain and Spine Surgery Evaluation Survey

The Pain and Spine Surgery Evaluation Survey (PASSS) is a questionnaire utilized by Jake Epker, Ph.D., in evaluating a patient's outcome for their spinal stimulator surgery. Questions on the test are divided into a pain/surgical category, and emotional category. For the pain/surgical category, four questions – asking the patient to report their average pain level, level that pain currently interferes with their lifestyle, how well the surgical outcome met their expectations, and how satisfied they are with the surgery – scored from zero to ten, with zero being "no pain" for the pain level and pain interference questions, and "not at all" for the surgical expectations and satisfaction questions, and with ten being the "worst imaginable" for the current average pain level, "severe" for current pain interference, and "perfectly" for the expectation and satisfaction questions. Next, eight likert questions follow that probe the patient's emotional state, asking if they feel "not at all," "a little," "somewhat," "a lot," or "extremely" of: depressed, nervous or tense, angry, irritable, happy, energetic, fearful, or worried. Score from "not at all" to "extremely" are scored from zero to four. In addition, the questionnaire asks for the patient to list their working status, and answers choices are "working full time outside the home," "working part time or restricted duty outside the home," "working at home (including homemaker)," "disabled," "retired," and "other." Lastly, any current medications – along with the dose and frequency - the patient is taking for their pain are to be listed above the three blank lines, forming the final question. Due to current available knowledge being that the PASSS questionnaire has not been used by many, its limitations are undetermined, but given that the initial pain level that patients were asked in this study during their pre-surgical evaluation, follow-up questions asked the same way to gauge any change in pain since having surgery should prove useful. In addition, assessing the emotional state of patients may aid in reinforcing their results from the MMPI-2-RF. For example, a patient reporting "a lot" of being nervous or

tense, and irritable, might reinforce conclusions drawn from their elevated scores for Stress/Worry (STW) and Anger Proneness (ANP) scales. This questionnaire is very similar to one detailed by Block and colleagues (2018), where a pain rating from one to ten, outcome satisfaction rating of one to ten, and likert were implemented.

Method

Personality and emotional functioning data (MMPI-2-RF) for these patients was collected before 25 underwent SCS surgery (and fourteen did not) and pain ratings at the time of the pre-surgical evaluation were given on a one-to-ten scale. This is an existing data set with previous IRB approval. Due to various factors later described in the discussion section, the total patient pool had far fewer participants than expected and included 25 surgical patients and fourteen non-surgical patients; all patients were approved for surgery. Whether a patient proceeded with surgery or not was likely determined by their respective doctor's plan for their pain treatment, and their own financial situation; the exact factors were not reported. The current study collected post-surgical data for PASSS and OSWESTRY Disability Index measures of pain – together forming the combined survey - and its interference on emotional (level of worry, happiness, energy, and more) and daily physical functioning (walking, traveling, self-care, and more). A telephone interview was conducted with each patient to obtain emails where a secure link to a Google form containing the questionnaires and informed consent form, were sent. Patients were each assigned a unique identification code – which was used to later match pre- and post-surgical data for a single patient - to ensure confidentiality of data during survey completion.

OSWESTRY and PASSS survey questions probed the following topics: pain level and functional interference of pain currently affecting the individual, their attitude and emotional response to their pain management, their work status, the medications they are currently taking

for pain management, and lastly how pain affects their ability to perform routine activities involving physical movement (such as personal care, walking, standing, and sex life). Answers were given on number scales or had values corresponding to number scales from zero to ten or zero to five, indicating how severe the pain endured (if any at all) by each patient is. Copies of the surveys and their questions are available in the appendix. The individuals' responses to the survey were entered into a Microsoft Excel document that was kept on an encrypted website. This data was combined with the existing MMPI-2-RF dataset containing data from the pre-surgical psychological evaluation and analyzed using SPSS (a software package used for statistical analysis) with assistance from the study supervisor, Benjamin Hill, Ph.D.

Statistical Analyses

The surgical group of 25 participants was separated into two further groups, called the *surgical success* group and the *surgical failure* group (named this way because the surgery of an individual with any decrease in pain was deemed successful, while the surgery of an individual with no change or any increase in pain was deemed unsuccessful), by identifying the difference between each participant's average pain level at the time of their pre-surgical evaluation and their current pain level reported on the PASSS questionnaire after having SCS surgery. One-way ANOVA (for the sake of statistical convenience, instead of a t-test) and comparison of means tests were utilized to identify statistical differences between *surgical failure* and *surgical success* groups for emotion data (i.e., "depressed," "nervous," etc.) of the PASSS, then of their MMPI-2-RF scales. Next, one-way ANOVA and comparison of means tests were again utilized, but instead with the surgical and non-surgical groups, identifying differences between their PASSS emotion scores, between PASSS reported pain levels and pain interference levels, and lastly between OSWESTRY functional scores. In addition, patients were classified to be "satisfied"

with the surgery if their satisfaction score on the PASSS was equal to or greater than five on a ten-point scale. Relations between surgical satisfaction and pain reduction were then identified through simple algebraic proportions.

Results

Statistically Significant Surgical Success and Failure Data (Appendix Tables 1.1-1.4)

In the ANOVA and comparison of means tests for *surgical success* and *surgical failure* groups, seven scales of the MMPI-2-RF were concluded to be significantly different for the two groups, with p values below or equal to the accepted value of p = .05, but eleven scales (significant or borderline-significant) are discussed. In this section and the next, average mean values are reported as *surgical failure* M_f and *surgical success* M_s. The *surgical failure* group had higher values compared to the *surgical success group* for the scales: symptom validity ($F(1,22) = 9.486$, $p = .005$ ($M_f = 70.00$, $M_s = 60.09$), demoralization $F(1,22) = 10.105$, $p = .004$ ($M_f = 56.46$, $M_s = 47.36$), self-doubt $F(1,22) = 13.620$, $p = .001$ ($M_f = 57.46$, $M_s = 45.64$), inefficacy $F(1,22) = 8.475$, $p = .008$ ($M_f = 53.92$, $M_s = 42.18$), anger proneness $F(1,22) = 4.379$, $p = .048$ ($M_f = 46.92$, $M_s = 41.55$), low positive emotions $F(1,22) = 4.925$, $p = .037$ ($M_f = 63.31$, $M_s = 54.36$), and somatic complaints $F(1,22) = 5.897$, $p = .024$ ($M_f = 63.31$, $M_s = 54.36$). For ANOVA and comparison of means tests of the *surgical failure* and *surgical success* group PASSS emotion scores, the only statistically significant difference was depression ($F(1,22) = 5.453$, $p = .029$) ($M_f = 1.31$, $M_s = .45$). These data indicate that compared to the *surgical success* group, the *surgical failure* group was overall, less stable in numerous aspects of emotionality and self-regulation, and perhaps support why their surgeries resulted in no reported pain decrease whatsoever; reference Tables 1.1 and 1.2 in the Appendix.

Statistically Insignificant Surgical Success and Failure Data (Appendix Tables 1.1-1.4)

For the same two tests previously reported, many other MMPI-2-RF scales and PASSS emotion scores were found to be statistically insignificant but range from close to distant from the .05 p value. Yet, by discussing these data, a clearer grasp on how vast the differences in emotional regulation between success and failure groups are, is obtained. The *surgical failure* group again has higher scores in all negative scales of the MMPI-2-RF, and most negative scores for the PASSS emotion questions. Comparison results for MMPI-2-RF scales are as follows, and the same "vs" applies as in the previous section: infrequent responses F(1,22) = 3.561, p = .072 (M_f = 62.77, M_s = 49.00), infrequent somatic responses F(1,22) = 3.268, p = .084 (M_f = 56.23, M_s = 48.55), response bias F(1,22) = 4.012, p = .060 (M_f = 67.30, M_s = 57.40), stress/worry F(1,22) = 3.580, p = .072 (M_f = 50.69, M_s = 44.73), introversion/low positive emotionality (1,22) = 3.966, p = .059) (M_f = 62.46, M_s = 54.09), antisocial behavior F(1,22) = 0.743, p = .398 (M_f = 45.69, M_s = 43.09), dysfunctional negative emotions F(1,22) = 2.021, p = .169 (M_f = 47.15, M_s = 42.91), and aggressiveness F(1,22) = 2.129, p = .159 (M_f = 49.31, M_s =45.00). For the PASSS emotion scores, there are: happy F(1,22) = 3.614, p = .070 (M_f = 1.77, M_s = 2.45), angry F(1,22) = 1.987, p = .173 (M_f = 0.77, M_s = 0.173), worried F(1,22) = .653, p = .428 (M_f = 1.00, M_s = 0.64), nervous F(1,22) = .001, p = .975 (M_f = 0.92, M_s = 0.91, irritable F(1,22) = 0.464, p = .503 (M_f = 1.31, M_s = 1.00), energetic F(1,22) = 2.107, p = .161 (M_f = 1.08, M_s = 1.64), and fearful F(1,22) = 0.177, p = .678 (M_f = 0.38, M_s = 0.27). Yet again, positive emotions (happy and energetic) are higher in the *surgical success* group, and negative emotions (aggressiveness and fearful) are lower in the same group; though these results are borderline-

significant at best, the same phenomenon as previously is described, and the *surgical success* group's differences are further highlighted as being stronger in emotional regulation and positive behaviors.

Non-Surgical vs Surgical Data (Appendix Tables 1.5-2.0)

Now, ANOVA and comparison of means test results of PASSS emotion and pain scores and OSWESTRY scores for the surgical and non-surgical groups are discussed. Comparisons are described in the format of non-surgical group vs surgical group as follows, with M_n and M_s serving as the non-surgical and surgical group means, respectively. As follows, comparison data for PASSS emotion scores are: depressed F(1,37) = 1.042, p = .314 (M_n = 1.29, M_s = 0.96), nervous F(1,37) = 0.885, p = .353 (M_n = 0.129, M_s = 0.96) angry F(1,37) = 1.954, p = .171 (M_n = 0.93, M_s = 0.56), irritable F(1,37) = 0.026, p = .873 (M_n = 1.21, M_s = 1.16), happy F(1,37) = 0.165, p = .687 (M_n = 2.21, M_s = 2.08), energetic F(1,37) = 2.668, p = .111 (M_n = 0.86, M_s = 1.36), fearful (F(1,37) = 2.859, p = .100 (M_n = 0.85, M_s = 0.36), and worried (F(1,37) = 0.951, p = .336 (M_n = 1.21, M_s = 0.88). The surgical group trumps the non-surgical group by having lower values of depression, anger, and other negative emotions, but falls short on the measure of happiness. To understand how pain is experienced and reported by those with or without spinal stimulators, these same comparisons were done for PASSS pain data: with current pain (p = .140, M_n = 5.43, M_s = 4.48) and pain interference (p = .147, M_n = 6.43, M_s = 5.24). As one would expect (and hope), the group having undergone surgery reports lower values of pain and interference from pain post-surgery. For the OSWESTRY Disability Index, the final comparison values are: pain intensity F(1,37) = 0.179, p = .674 (M_n = 2.00, M_s = 1.84), personal care F(1,37) = 0.069, p = .794 (M_n = 0.86, M_s = 0.96), weight lifting F(1,37) = 0.025, p = .876 (M_n = 3.36, M_s = 3.32), walking F(1,36) = 0.530, p = .471 (M_n = 1.64, M_s = 1.92), sitting F(1,36) = 0.358, p

= .553 (M_n = 1.71, M_s = 1.88), standing F(1,37) = 0.630, p = .433 (M_n = 2.93, M_s = 2.63), sleeping F(1,37) = 0.303, p = .585 (M_n = 1.64, M_s = 1.84), sex life F(1,27) = 0.019, p = .891 (M_n = 2.82, M_s = 2.72), social life F(1,36) = 1.992, p = .167 (M_n = 2.71, M_s = 2.12), and travelling F(1,37) = 0.328, p = .570 (M_n = 1.57, M_s = 1.76). These statistically insignificant functional measures of pain (besides social life as a borderline-significant value) differ from previous results where surgical or *surgical success* patients fared better than non-surgical or *surgical failure* patients.

Discussion

Though many comparisons in this study are borderline-significant, they will be further discussed with the significant values to attempt painting a picture to best explain the results. As discussed numerous times in the literature review, an inability to regulate oneself and emotions, or to control impulses that urge one to believe that their pain controls them (the concept/construct of emotion dysregulation), and that no treatments are viable, or any other negative emotions or feelings, may prove detrimental in the treatment of one's chronic pain (Block, 2017; Epker & Block, 2001; Marek, 2020; Mesholam, 1999; Solberg, Roach, and Segerstrom, 2009). With the *surgical success* group being superior in most facets related to qualities paramount to having a successful SCS surgery, it seems quite reasonable that they would have positive results and pain reduction from the surgery, and further, mostly be satisfied with it, which they are. In contrast, with the *surgical failure* group having higher stress and worry, low positive emotions, more anger proneness, and feelings of anger, worry, and fear (among all other scales and scores previously detailed), when previous literature is considered, it is no wonder that they have unsuccessful surgeries, as their emotional states and predictive MMPI-2-RF scores are exactly what predict unsuccessful surgeries.

These results directly support hypothesis one - which stated that patients with less negative symptoms that predict poor surgical success would have better outcomes than those with more negative symptoms - because the surgical success group had fewer elevated scores for MMPI-2-RF scales related to emotion dysregulation, and also had lower scores for irritability, anger, fear, and worry. Hypothesis two – proposing that the MMPI-2-RF would be able to predict surgical outcome – is also aided by these findings, because alongside the PASSS, the MMPI-2-RF scales indicated inhibited emotional regulatory ability for those who had poorer surgical outcomes.

Further, though the surgical group as a whole had lower pain scores, they had roughly equal scores for functional measures of pain in the OSWESTRY as the non-surgical group. Overall, patients of the surgical group felt better emotionally and about the management of their pain but had comparable physical limitations resulting from pain as the non-surgical group. Thinking about the difficulty of identifying candidates for SCS surgery on the basis of emotion regulation, perhaps those patients who mostly rate the surgery as satisfactory and have reduced pain, actually do experience as much functional difficulty as those without the stimulator. If this is the case, then perhaps the reason they report seemingly contradictory information on the PASSS emotion questions, is because they are more able to regulate their emotions, and not feel that their pain and surgery are crippling or all-consuming. Further, these statements make the stimulators (in this specific study) appear to not reduce pain by much, because if they were, one would expect the surgical group to outperform the non-surgical group on the OSWESTRY measures, which they did not. Perhaps, in this study and small patient pool, that the stimulators serve as peace of mind for those who have them, and thus they believe that they are experiencing less pain as a result; when in reality, they actually are experiencing as much disability as those without the stimulator. If this were the case, stimulators would at least have value in that they help patients believe that

they are experiencing less pain, and perhaps as a result, they report more positive emotions via the PASSS questionnaire.

Future Directions

Obtained data allowed for conclusions to be drawn about factors differing between patients whom the surgery did and did not work for, and in addition, whether spinal stimulators benefit those who have them implanted. Future research should focus on recruiting a larger patient pool to yield more statistically significant data that may or may not support the research built upon (and relied on) by this study and other literature. By beginning data collection earlier (sooner than 2-10 years after surgery, as done in this surgery), more patients might respond and participate in the study. In addition, with a larger patient pool, the efficacy of spinal column stimulators could be further investigated by utilizing matching to investigate whether two similar patients would have different outcomes if SCS surgery were the only factor differing between them. Lastly, with a diverse patient pool, the effects of marital status, years of education, and other demographic factors, could be utilized to identify other confounds affecting SCS surgery outcomes; demographic information obtained from patients was often based on estimates, and thus was not discussed thoroughly in this research. Perhaps educational efforts should be considered by doctors providing SCS surgery to their patients to help inform them about their stimulator's upkeep, and possibly more effective pain management.

Appendix

Table 1.1. Surgical Success PASSS One-Way ANOVA (No Pain Decrease vs Pain Decrease)

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Depressed	Between Groups	4.337	1	4.337	5.453	.029
	Within Groups	17.497	22	.795		
	Total	21.833	23			
Nervous	Between Groups	.001	1	.001	.001	.975
	Within Groups	25.832	22	1.174		
	Total	25.833	23			
Angry	Between Groups	.980	1	.980	1.987	.173
	Within Groups	10.853	22	.493		
	Total	11.833	23			
Irritable	Between Groups	.564	1	.564	.464	.503
	Within Groups	26.769	22	1.217		
	Total	27.333	23			
Happy	Between Groups	2.798	1	2.798	3.614	.070
	Within Groups	17.035	22	.774		
	Total	19.833	23			
Energetic	Between Groups	1.865	1	1.865	2.107	.161
	Within Groups	19.469	22	.885		
	Total	21.333	23			

Fearful	Between Groups	.075	1	.075	.177	.678
	Within Groups	9.259	22	.421		
	Total	9.333	23			
Worried	Between Groups	.788	1	.788	.653	.428
	Within Groups	26.545	22	1.207		
	Total	27.333	23			

Table 1.2. Surgical Success PASSS Comparison of Means (No Pain Decrease vs Pain Decrease)

Report

PainDecrease		Depressed	Nervous	Angry	Irritable	Happy	Energetic	Fearful	Worried
No	Mean	1.31	.92	.77	1.31	1.77	1.08	.38	1.00
	N	13	13	13	13	13	13	13	13
	Std. Deviation	.947	1.038	.725	1.109	.927	1.038	.650	1.225
Yes	Mean	.45	.91	.36	1.00	2.45	1.64	.27	.64
	N	11	11	11	11	11	11	11	11
	Std. Deviation	.820	1.136	.674	1.095	.820	.809	.647	.924
Total	Mean	.92	.92	.58	1.17	2.08	1.33	.33	.83
	N	24	24	24	24	24	24	24	24
	Std. Deviation	.974	1.060	.717	1.090	.929	.963	.637	1.090

Table 1.3. Surgical Success MMPI-2-RF ANOVA (No Pain Decrease vs Pain Decrease)

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Infrequent Responses	Between Groups	1129.651	1	1129.651	3.561	.072
	Within Groups	6978.308	22	317.196		
	Total	8107.958	23			
Infrequent Somatic Responses	Between Groups	351.923	1	351.923	3.268	.084
	Within Groups	2369.035	22	107.683		
	Total	2720.958	23			
Symptom Validity	Between Groups	585.049	1	585.049	9.486	.005
	Within Groups	1356.909	22	61.678		
	Total	1941.958	23			
Response Bias	Between Groups	490.050	1	490.050	4.012	.060
	Within Groups	2198.500	18	122.139		
	Total	2688.550	19			
Demoralization	Between Groups	493.182	1	493.182	10.105	.004
	Within Groups	1073.776	22	48.808		
	Total	1566.958	23			
Somatic Complaints	Between Groups	550.881	1	550.881	5.897	.024
	Within Groups	2055.077	22	93.413		
	Total	2605.958	23			
Low Positive Emotions	Between Groups	476.644	1	476.644	4.925	.037

	Within Groups	2129.315	22	96.787		
	Total	2605.958	23			
Antisocial Behavior	Between Groups	40.322	1	40.322	.743	.398
	Within Groups	1193.678	22	54.258		
	Total	1234.000	23			
Dysfunctional Negative Emotions	Between Groups	107.357	1	107.357	2.021	.169
	Within Groups	1168.601	22	53.118		
	Total	1275.958	23			
Self-Doubt	Between Groups	833.182	1	833.182	13.620	.001
	Within Groups	1345.776	22	61.172		
	Total	2178.958	23			
Inefficacy	Between Groups	687.441	1	687.441	8.475	.008
	Within Groups	1784.559	22	81.116		
	Total	2472.000	23			
Stress/Worry	Between Groups	212.007	1	212.007	3.580	.072
	Within Groups	1302.951	22	59.225		
	Total	1514.958	23			
Anger Proneness	Between Groups	172.308	1	172.308	4.379	.048
	Within Groups	865.650	22	39.348		
	Total	1037.958	23			
Aggressiveness	Between Groups	110.564	1	110.564	2.129	.159
	Within Groups	1142.769	22	51.944		
	Total	1253.333	23			

Introversion/Low positive emotionality	Between Groups	417.485	1	417.485	3.966	.059
	Within Groups	2316.140	22	105.279		
	Total	2733.625	23			

Table 1.4. Surgical Success MMPI-2-RF Comparison of Means (No Pain Decrease vs Pain Decrease)

Report

PainDec		Infrequent Responses	Infrequent Somatic Responses	Symptom Validity	Response Bias	Demoralization	Somatic Complaints	Low Positive Emotions
No	Mean	62.77	56.23	70.00	67.30	56.46	69.62	63.31
	N	13	13	13	10	13	13	13
	Std. Deviation	19.439	12.518	7.649	13.284	7.523	10.774	9.160
Yes	Mean	49.00	48.55	60.09	57.40	47.36	60.00	54.36
	N	11	11	11	10	11	11	11
	Std. Deviation	15.633	6.991	8.093	8.235	6.281	8.136	10.595
Total	Mean	56.46	52.71	65.46	62.35	52.29	65.21	59.21
	N	24	24	24	20	24	24	24
	Std. Deviation	18.776	10.877	9.189	11.895	8.254	10.644	10.644

Antisocial Behavior	Dysfunctional Negative Emotions	Self-Doubt	Inefficacy	Stress/Worry	Introversion/Low Positive Emotionality	Anger Proneness	Aggressiveness
45.69	47.15	57.46	53.92	50.69	62.46	46.92	49.31
13	13	13	13	13	13.00	13.00	13.00
8.948	8.153	9.070	10.555	9.322	11.81	7.44	9.30
43.09	42.91	45.64	43.18	44.73	54.09	41.55	45.00
11	11	11	11	11	11.00	11.00	11.00
4.826	6.090	5.988	6.691	5.101	8.02	4.48	3.23
44.50	45.21	52.04	49.00	47.96	58.63	44.46	47.33
24	24	24	24	24	24.00	24.00	24.00
7.325	7.448	9.733	10.367	8.116	10.90	6.72	7.38

Table 1.5. Non-Surgical vs Surgical PASSS Emotion One-Way ANOVA

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Angry	Between Groups	1.219	1	1.219	1.954	.171
	Within Groups	23.089	37	.624		
	Total	24.308	38			
Depressed	Between Groups	.952	1	.952	1.042	.314
	Within Groups	33.817	37	.914		
	Total	34.769	38			
Nervous	Between Groups	.952	1	.952	.885	.353
	Within Groups	39.817	37	1.076		
	Total	40.769	38			
Irritable	Between Groups	.026	1	.026	.026	.873
	Within Groups	37.717	37	1.019		
	Total	37.744	38			
Happy	Between Groups	.162	1	.162	.165	.687
	Within Groups	36.197	37	.978		
	Total	36.359	38			
Energetic	Between Groups	2.269	1	2.269	2.668	.111
	Within Groups	31.474	37	.851		
	Total	33.744	38			

Fearful	Between Groups	2.021	1	2.021	2.859	.100
	Within Groups	25.452	36	.707		
	Total	27.474	37			
Worried	Between Groups	1.003	1	1.003	.951	.336
	Within Groups	38.997	37	1.054		
	Total	40.000	38			

Table 1.6. Non-Surgical vs Surgical PASSS Emotion Comparison of Means

Report

Surgery Group		Depressed	Nervous	Angry	Irritable	Happy	Energetic	Fearful	Worried
No surgery	Mean	1.29	1.29	.93	1.21	2.21	.86	.85	1.21
	N	14	14	14	14	14	14	13	14
	Std. Deviation	.914	.994	.917	.893	1.122	.864	1.144	.893
Surgery	Mean	.96	.96	.56	1.16	2.08	1.36	.36	.88
	N	25	25	25	25	25	25	25	25
	Std. Deviation	.978	1.060	.712	1.068	.909	.952	.638	1.092
Total	Mean	1.08	1.08	.69	1.18	2.13	1.18	.53	1.00
	N	39	39	39	39	39	39	38	39
	Std. Deviation	.957	1.036	.800	.997	.978	.942	.862	1.026

Table 1.7 Non-Surgical vs Surgical PASSS Pain One-Way ANOVA

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Current_Pain	Between Groups	8.075	1	8.075	2.269	.140
	Within Groups	131.669	37	3.559		
	Total	139.744	38			
Pain_Interfere	Between Groups	12.678	1	12.678	2.192	.147
	Within Groups	213.989	37	5.783		
	Total	226.667	38			

Table 1.8 Non-Surgical vs Surgical PASSS Comparison of Means

Report

Surgery Group		Current_Pain	Pain_Interfere
No surgery	Mean	5.43	6.43
	N	14	14
	Std. Deviation	1.989	2.243
Surgery	Mean	4.48	5.24
	N	25	25
	Std. Deviation	1.828	2.488
Total	Mean	4.82	5.67
	N	39	39
	Std. Deviation	1.918	2.442

Table 1.9 Non-Surgical vs Surgical OSWESTRY One-Way ANOVA

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Pain_Intensity	Between Groups	.230	1	.230	.179	.674
	Within Groups	47.360	37	1.280		

	Total	47.590	38			
Personal_Care	Between Groups	.095	1	.095	.069	.794
	Within Groups	50.674	37	1.370		
	Total	50.769	38			
Lifting	Between Groups	.012	1	.012	.025	.876
	Within Groups	18.654	37	.504		
	Total	18.667	38			
Walking	Between Groups	.663	1	.663	.530	.471
	Within Groups	45.048	36	1.251		
	Total	45.711	37			
Sitting	Between Groups	.246	1	.246	.358	.553
	Within Groups	25.497	37	.689		
	Total	25.744	38			
Standing	Between Groups	.815	1	.815	.630	.433
	Within Groups	46.554	36	1.293		
	Total	47.368	37			
Sleeping	Between Groups	.349	1	.349	.303	.585
	Within Groups	42.574	37	1.151		
	Total	42.923	38			
Sex_Life	Between Groups	.063	1	.063	.019	.891
	Within Groups	89.247	27	3.305		
	Total	89.310	28			
Social_Life	Between Groups	3.070	1	3.070	1.992	.167
	Within Groups	55.482	36	1.541		
	Total	58.553	37			
Travelling	Between Groups	.319	1	.319	.328	.570
	Within Groups	35.989	37	.973		
	Total	36.308	38			

Table 2.0. Non-Surgical vs Surgical OSWESTRY Comparison of Means

Report

Had_Surgery		Pain Intensity	Personal Care	Lifting	Walking
N	Mean	2.00	.86	3.36	1.64
	N	14	14	14	14
	Std. Deviation	1.038	1.167	.633	1.082
y	Mean	2.06	1.18	3.35	1.88
	N	17	17	17	17
	Std. Deviation	1.144	1.185	.786	.993
Y	Mean	1.37	.50	3.25	2.00
	N	8	8	8	7
	Std. Deviation	1.188	1.069	.707	1.528
Total	Mean	1.90	.92	3.33	1.82
	N	39	39	39	38
	Std. Deviation	1.119	1.156	.701	1.111

Sitting	Standing	Sleeping	Sex Life	Social Life	Travelling
1.71	2.93	1.64	2.82	2.71	1.57
14	14	14	11	14	14
.726	.917	.842	1.991	1.139	.646
1.94	2.63	1.76	2.85	2.38	1.94
17	16	17	13	16	17
.899	1.204	1.251	1.676	1.360	1.298
1.75	2.63	2.00	2.40	1.63	1.38
8	8	8	5	8	8
.886	1.408	1.069	1.949	1.061	.518
1.82	2.74	1.77	2.76	2.34	1.69
39	38	39	29	38	39
.823	1.131	1.063	1.786	1.258	.977

Pain and Spinal Surgery Evaluation Survey (PASSS)

Follow-up Questionnaire

Have you had surgery yet?

___Yes

Approximate Date of Surgery _____

What is your current average pain level (circle the number)?

0 1 2 3 4 5 6 7 8 9 10

(no pain) (moderate) (worst imaginable)

How much does pain currently interfere with your lifestyle (circle the number)?

0 1 2 3 4 5 6 7 8 9 10

(no pain) (moderate) (severe)

How well did the outcome of surgery meet your expectations?

0 1 2 3 4 5 6 7 8 9 10

(not at all) (moderate) (perfectly)

How satisfied are you with the surgery, overall?

0 1 2 3 4 5 6 7 8 9 10

(not at all) (moderate) (perfectly)

Please indicate how strongly you feel about each of the following: (Place X in the circle)

	Not at all (0)	A little (1)	Somewhat (2)	A lot (3)	Extremely (4)
Depressed	O	O	O	O	O
Nervous or Tense	O	O	O	O	O
Angry	O	O	O	O	O
Irritable	O	O	O	O	O
Happy	O	O	O	O	O
Energetic	O	O	O	O	O
Fearful	O	O	O	O	O
Worried	O	O	O	O	O

Please indicate your current work status

Working full time outside the home__ (1)

Working part time or restricted duty outside the home__ (2)

Working at home (including Homemaker) __ (3)

Disabled__ (4)

Retired__ (5)

Other__ (6)

What medications are you taking FOR YOUR PAIN?:

Type:_____ Dose and Frequency:_____

Type:_____ Dose and Frequency:_____

Type:_____ Dose and Frequency:_____

Please answer every section. Mark one box only in each section that most closely describes you today.

OSWESTRY Disability Index

Section 1 – Pain Intensity

I have no pain at the moment____ (0)

The pain is very mild at the moment____ (1)

The pain is moderate at the moment____ (2)

The pain is fairly severe at the moment____ (3)

The pain is very severe at the moment____ (4)

The pain is the worst imaginable at the moment. (5)

Section 2 – Personal Care (Washing, Dressing, etc.)

I can look after myself normally without causing extra pain____ (0)

I can look after myself normally but it is very painful____ (1)

It is painful to look after myself and I am slow and careful____ (2)

I need some help but manage most of my personal care____ (3)

I need help everyday in most aspects of self care____ (4)

I do not get dressed, wash with difficulty and stay in bed____ (5)

Section 3 - Lifting

I can lift heavy weights without extra pain____ (0)

I can lift heavy weights but it gives extra pain____ (1)

Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned, e.g. on a table____ (2)

Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned____ (3)

I can lift only very light weights____ (4)

I cannot lift or carry anything at all____ (5)

Section 4 – Walking

Pain does not prevent me from walking any distance____ (0)

Pain prevents me from walking more than 1 mile____(1)

Pain prevents me from walking more than ½ mile____(2)

Pain prevents me from walking more than 100 yards____(3)

I can only walk using a stick or crutches____(4)

I am in my bed most of the time and have to crawl to the toilet____(5)

Section 5 – Sitting

I can sit still in any chair as long as I like____(0)

I can sit in my favorite chair as long as I like____(1)
Pain prevents me sitting more than 1 hour____(2)

Pain prevents me sitting more than ½ hour____(3)

Pain prevents me sitting more than 10 minutes____(4)

Pain prevents me from sitting at all____(5)

Section 6 – Standing

I can stand as long as I want without extra pain____(0)

I can stand as long as I want but it gives me extra pain____(1)

Pain prevents me from standing for more than 1 hour____(2)

Pain prevents me from standing for more than ½ an hour____(3)

Pain prevents me from standing for more than 10 minutes____(4)

Pain prevents me from standing at all____(5)

Section 7 – Sleeping

My sleep is never disturbed by pain____(0)

My sleep is occasionally disturbed by pain____(1)

Because of pain I have less than 6 hours of sleep____(2)

Because of pain I have less than 4 hours of sleep____(3)

Because of pain I have less than 2 hours of sleep____(4)

Pain prevents me from sleeping at all____(5)

Section 8 – Sex Life (if applicable)

My sex life is normal and causes no extra pain____(0)

My sex life is normal but causes some extra pain____(1)

My sex life is nearly normal but is very painful____(2)

My sex life is severely restricted by pain____(3)

My sex life is nearly absent because of pain____(4)

Pain prevents any sex life at all____(5)

Section 9 – Social Life

My social life is normal and causes me no extra pain____(0)

My social life is normal but increases the degree of pain____(1)

Pain has no significant effect on my social life apart from limiting my more energetic interests. E.g. sport, etc. (2)

Pain ahs restricted my social life and I do not go out as often____ (3)

Pain has restricted my social life to my home____(4)

I have no social life because of pain____(5)

Section 10 – Traveling

I can travel anywhere without extra pain____(0)

I can travel anywhere but it gives me extra pain____(1)

Pain is bad but I can manage journeys over two hours____(2)
Pain restricts me to journeys of less than one hour____(3)

Pain restricts me to short necessary journeys under 30 minutes____(4)

Pain prevents me from traveling except to receive treatment____(5)

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