MASSAGE THERAPY: MIND/BODY EFFECTS ON CHRONIC PAIN PATIENTS

THESIS

Presented to the Graduate Council of the University of North Texas in Partial Fulfillment of the Requirements

For the Degree of

MASTER OF ARTS

By

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This study assessed the influence of massage therapy on the psychobiology of chronic pain patients. A pre- and posttest design measured the effects of a one-month treatment program.

Twenty outpatients and twenty inpatients of two chronic pain treatment programs, were administered several psychological and physiological tests before and after the study. Experimental subjects received massage therapy twice a week for one month in addition to their other therapies. Control subjects continued with their regular treatment modalities for one month. Results showed statistically significant differences ($p < .05$) on 5 of the 17 psychological variables and on the electromyograph levels. Analysis of Holmes-Rahe scores suggested that these differences were not attributable to the artifact effect of differential life stress.
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Pain has been one of the most provocative problems in medicine and biology, posing a challenge to the sufferer who must learn to live with the pain for which no cure has been found, and a challenge to the physician and other health-care professionals who seek every possible means to help the suffering patient. Massage therapy is one form of physical therapy that has been used again and again to alleviate pain. In fact, it has become a common response to apply manual pressure to an injury (Juhan, 1987).

While the origin of pain may vary, it has been shown to be conducted to the central nervous system via afferent fibers of the autonomic nervous system (Link, 1985). Lewis (1959) concluded that the stimulus for pain arises out of a contraction process that produces a chemical substance which is stored when the vessels are occluded. He further observed that pain will occur during sustained muscle contraction. For example, sustained voluntary or involuntary contraction of the neck while watching an improperly placed television set, using a microscope, or driving for long distance gives rise to pain and stiffness in the neck as well as headaches.
Simons, Budzynski, Stoyva, Adler and Mullaney (1973) have observed that pain produced experimentally in a restricted focus of the head gives rise to a second more generalized pain - headache. These authors believe this kind of headache is due to tension in the neck musculature.

Wolff and Homes (1968) believe that while in many instances the primary local cause of backache is minimal but the muscle tension produced by emotional anxiety and distress which causes secondary pain in the back may outlast and exceed the primary pain. Apparently, our emotional stress may produce a secondary pain due to ischemia. What may follow is a vicious cycle of deep pain, sustained muscle contraction, deep pain, sustained muscle contraction.

The treatment effect of massage in these pain syndromes has been concerned with breaking this vicious cycle. Since the secondary pain of sustained muscle contraction is the result of decreased circulation ceased by pressure upon the vessels within the contracted muscles, the primary role of massage is to improve the circulation. The secondary roles include the breakdown of adhesions, release of fascia restricting the muscles, and the removal of waste products, such as lactic acid.

Undoubtedly, the psychological aspects of massage are also quite important. In infancy, pain often leads to crying and a response from the mother or loved one. This
association of pain-crying, comfort from a loved one, and subsequent relief of pain may be an aspect of pain afforded by therapeutic massage (Iskoldskaya 1967).

Montagu (1972) first came to realize the significance of the contact between mother and baby when he discovered that an animal licks her newborn to stimulate the offspring's vital organs. Without this cutaneous stimulation, the offspring would fail to stand and consequently die. This discovery in turn led Montagu to understand that certain critical functions are also served when human mothers cradle and nurse their babies. These functions are related to the deep psychophysiological needs of children following birth, especially the needs of consolation and reassurance.

Several episodes throughout history have attested to the primary need of touch for survival. Knox (1915) discovered that if orphaned infants were not cuddled, fondled and stroked, they would die, despite proper nutrition and medical care. Doctors of the time considered these symptoms of sensory deprivation a disease. Merasmus or wasting away was very widespread in institutionalized children, and affected bone growth, weight gain, muscular coordination, immunological function, and general affect. Spitz (1945), Harlow (1958) and Dennis (1960), concluded that this wasting away of infants was caused by lack of touch and pleasant stimulation, which is crucial for proper
development. If adequate tactile stimulation is present at the early stages of life, the effects last throughout the organism's life with superior functions and immunological resistance (Casler, 1968).

Evidence has indicated that the perception associated with one type of sensory input is modified when there is another type of sensory input arriving at the same time and at the same level of the spinal cord (Engle, 1958; Libet, 1957; Ralston, 1957). It is possible that afferent impulses from the brain, acting through the reticular formation of the brain stem produce inhibition of sensory impulses as they arrive at the receiving nuclei in the central nervous system.

Some of the early work in massage dealt with the effects of massage on blood pressure (Edgecomb & Bain, 1988). G. Oliver (1920) stated that the net result of massage was a decrease in blood pressure as long as the abdomen was not massaged too vigorously. Work done with dogs in the 1950's showed considerable evidence that massage does improve the transport of food and oxygen to the cells (Ladd, Lear, & Mason, 1958).

Serverini and Venerando (1960) reported that superficial massage produced significant changes in skin temperature. Their findings on deep massage showed an appreciable and effective increase in blood flow into the muscles.
The Barr and Taslitz study (1970) showed that systolic and diastolic blood pressure tended to decrease after a 20-minute back massage with a delayed effect of an increase in systolic pressure and a small additional decrease in diastolic pressure. In addition, the heart rate increased. Also reported was an increase in skin sweating and a decreased resistance to galvanic currents. A wide variation in changes of skin temperature in both control and treatment groups led Barr and Taslitz to conclude that it could not be inferred that massage either increased or decreased skin temperature.

Mennel (1945) knew of no direct action upon the heart as a result of the usual externally applied massage movements. However, 15 years later, Kouwenhoven, Delius and Target (1960) reported 70% permanent survival rate of patients with cardiac arrest who were given closed chest cardiac massage.

Physiological changes were discovered by Gellhorn, Giardano and Everly (1979) when proprioceptive impulses exerted a strong influence on the sympathetic division of the hypothalamus. Their findings suggest that a relaxation of skeletal musculature is accompanied by a reduction in the state of excitability of the sympathetic division of the hypothalamus and by a similar reduction in the cerebral cortex. These observations could account for the feeling
of physical and mental relaxation occurring in the study's subjects.

Juhan (1987) cited that meditation has been shown to create what is called a "wakeful, hypometabolic state," a parasympathetic response. In this state the heart slows as does the respiratory rate, with the direct result that the body's use of oxygen and production of carbon dioxide drop, indicating an overall reduction in the rate of metabolism. At the same time, an increase in blood flow to the muscles can be observed, stepping up their oxygenation even though the breath and the heart rate have slowed down. This in effect reduces the level of lactate in the blood through less anaerobic glycolysis taking place in the muscle tissue. During meditation, the brain's production of alpha waves also increases, indicative of deep relaxation bordering on sleep.

These same body responses Juhan reports, have been induced during massage: a slower and deeper respiratory rhythm, a slower heart rate, a diminishing of muscular tension both in chronically congested areas and in the overall muscle tone, an increased blood flow through the visceral and skeletal muscles, and a more efficient use of available energy (Juhan, 1987).

A study of the effects of massage on trunk flexion was carried out by Bierman and Nordschow (1960) with 25 normal people who had low back massage and posterior massage of
the lower extremities. In every case there followed an increased ability to flex the trunk and hip as measured by the "finger to floor" test. The authors concluded that manual massage can cause relaxation of voluntary muscles.

Unfortunately, very little research has been published on the psychological effects of massage. However, Link (1985) compared the effectiveness of three stress-management treatments, including massage therapy. He found a significant reduction ($p < .05$) on psychological measures of Type A behavior and emotional symptoms of stress ($p < .05$). The massage therapy treatment showed the most significant results, as compared to a floatation treatment and stress-management treatments. Genter (1980) reported a significant decrease ($p < .01$) as a result of massage in the loneliness of elderly females in a nursing home. The experimental group received a 15-minute back massage every day for 5 days. The same amount of time was spent with the control group, but no contact was made with these subjects. The finding showed no change in the parameters measured for the control group.

Despite the obvious beneficial effects of massage, many in the medical community consider it to be obsolete. In fact evidence suggests that massage still has many therapeutic applications in today's touch-starved world. Clearly, the medical community would benefit from
investigating the possible effects of massage therapy on rehabilitative and preventive measures.

The purpose of this study was to determine the effects of massage therapy on psychological measures, such as mood and affect and a sense of well-being, as well as physiological changes occurring as a result of massage therapy. Further, it was the purpose of the study to assess the influence of massage therapy on psychophysiological indices of patients under-going other modalities for chronic pain.

It was hypothesized that:

1. With the addition of massage therapy, there would be an increase in beneficial psychological changes over those obtained through two pain management programs, and
2. there would be a reduction in the physiological variables of heart rate, blood pressure, peripheral skin temperature, and skeletal muscle tension.
CHAPTER II

METHODS

Subjects

Subjects were 40 patients in chronic pain treatment programs (26 males and 14 females, age range 20-66); 20 were inpatients assigned on the date of admission and 20 were volunteer outpatients). The inpatient and outpatient groups were divided into groups receiving massage therapy; thus four groups were formed with 10 patients in each group. The massage groups received a 1-hour massage twice a week for 3-4 weeks along with the initial treatment of pain management they were receiving, the control groups received 3-4 weeks of pain management treatment.

Measurement Techniques

Physiological measures included muscular tension, blood pressure, heart rate and peripheral (external) skin temperature, all of which assess an individual's relaxation response. To determine the status of nervous system impulses, a number of comparisons can be made which assess the individual's ability to elicit a relaxation response. The physiological status of a subject was determined by use in biofeedback equipment manufactured by the J&J Co. which enabled the researcher to identify subtle physiological
changes in the body's condition of homeostasis. The direction of change which occurred was observed by an electromyograph, pulse meter and peripheral skin temperature feedback.

**Muscle Tension**

Levels of muscular tension are observably high during arousal since peripheral muscles are geared for quick responding (Selye, 1976). Harvey (1978) suggests that relaxation response is indicated by reduction in muscular tension. Pelletier (1977) points out the efficacy of an electromyograph in dealing with neuromuscular disorders.

**Finger Temperature Feedback**

Peripheral skin (finger) temperature feedback, developed through the laboratory work of Elmer and Alyce Green (Sargent et al., 1972) in treating migraine headaches, has been used as a general method for the treatment of stress related syndromes (Gaarder & Montgomery, 1981). While the temperature may vary with individuals, increases in finger skin temperature have been associated with the relaxation response (Silver, Blanchard, Williams, Theobold, & Brown, 1979).

**Blood Pressure**

Blood pressure is a highly variable physiological measure under the influence of the autonomic nervous system. Impulses which elevate the pressure are ergotropic or sympathetic, while parasympathetic responses lower the
pressure (Benson, 1972). It has been observed that blood pressure is reduced during the relaxation response (Charlesworth, Murphy & Beutler, 1980). (This move toward deep relaxation has been termed a trophotropic response and has received increased attention as a relaxation response [Benson, Beary, & Carol, 1974]).

**Heart Rate**

Average heart rates vary but Basmajian (1978), Benson (1979), and Lobitz and Brammill (1981) suggest that a lowered heart rate is to be expected during a relaxation response. While these measures may vary between conditions of arousal and relaxation, all measures were taken while subjects were reclined in a resting condition.

**Psychological Measures**

The Holmes-Rahe Schedule of Recent Experience (SRE) (Holmes & Rahe, 1967), composed of 43 items (see Appendix B) has been used to identify experiences requiring major or minor lifestyle adjustments over the most recent 12-month period. Each item represents a life change, such as marriage, pregnancy, change in financial status, vacations, trouble with in-laws, or changing residence. The questionnaire is designed to incorporate the realization that different kinds of events have different degrees of impact on a person's life and health. Persons who score 150 or below on this scale have roughly a 30% chance of experiencing significant illness during the coming year.
Those who score 300 and above face approximately an 80% chance of experiencing significant illness within the next year. The number of adjustments has been correlated with time-loss illness and probability of accidents (Rahe, 1974). The use of the SRE is intended as a measure of "state" related stress.

The Profile of Mood States (POMS), McNair, Lorr, and Droopleman (1971) is an adjective rating form (see Appendix C) designed to measure mood states of intermediate duration. The POMS contains 65 adjectives describing mood, to be self-rated by the examinee on a 5-point, Likert-type scale from "extremely" (4) to "not at all" (0). Factor analysis of the standardization sample yielded factors describing six dimensions of mood, including tension-anxiety, depression-dejection, anger-hostility, confusion-bewilderment, vigor-activity, and fatigue-inertia. The POMS has been described as testing more momentary mood states, those that are more responsive to changes in the environment. As such, the POMS has been used mainly to detect changes in mood which follow relatively brief interventions such as relaxation training, exercise, or stress management. Validation studies have shown good internal consistency, and test-retest reliability reports distress. The scale contains six subscales and a global scale made up of the sums of scores on the six subscales. The subscales measure relaxed versus tense-anxious moods,
depressed versus cheerful moods, satisfying or interesting personal life, health worry, energy level, and emotional-behavioral control. This test has been used successfully in several large studies and is considered fairly sensitive to global changes taking place over a rather short-term period of study. Test-retest reliability at 3 months was determined to be .851, indicating adequate consistency across time.

The Dallas Pain Questionnaire (DPQ) is a 16-item visual analogue scale (see Appendix E) that was designed to assess the impact of chronic pain on patients' daily work-leisure activities, as well as on their perceived anxiety-depression and social interests. Cuenas (1988) found that the DPQ's test-retest reliability coefficient was .970, ($p < .0001$). Analyses on the 4 subscales derived coefficients of .971 for Daily Activities, .984 for work-leisure, .943 for anxiety-depression, and .966 for social interest.

**Procedure**

All subjects signed an informed consent form (see Appendix A) designed to inform them of the experimental nature of this study, the expected sequence of events during the subjects' participation and the expectations incumbent upon them during their participation. The psychological questionnaires and physiological indices were measured before treatment began for the four groups.
The outpatient massage groups (n=10) received osteopathic manipulative treatment, postural awareness, exercise programs, home self-treatment plans, and massage therapy. The latter included the manipulation of soft tissue for therapeutic purposes and could include, but is not limited to, efflueurage, petrissage, compression, friction, cross-fiber friction, acupressure, and other Swedish movements, either by hand or with mechanical or electrical apparatus for the purpose of body massage. The outpatient control group (n=10) received osteopathic manipulative treatment, postural awareness instruction, exercise programs, and home self-treatment plans, but no massage therapy. The inpatient massage group (n=10) received a comprehensive program of pain management including biofeedback, physical therapy, occupational therapy, recreational therapy, group therapy, individual therapy, operant conditioning, dietary and weight education, back school training, individual education, structural diagnosis and massage therapy. The inpatient control group (n=10) also received physical therapy, occupational therapy, recreational therapy, biofeedback, operant conditioning, group therapy, individual therapy, dietary and weight education, back school training, individual education and structural diagnosis but again no massage therapy. Upon completion of the one-month program
all psychological and physiological indices were remeasured.
CHAPTER III

RESULTS

Pretest data were analyzed by t tests to ensure that the groups were comparable on these variables at pretest, in keeping with the assumptions of analysis of variance. The results of the t test are found in Tables 1-4.

Comparison of relevant variables at pretest indicated equivalency of groups, such that this assumption of analysis of variance was not violated. The two pairs of groups were not significantly different on most of the pretest scores on the psychological instruments. The outpatient groups were found to be significantly different on the Profile of Mood States-Vigor scale, and the Dallas Pain Questionnaire Social Interest scale. The inpatient groups were found to be significantly different on the General Well Being Total, Cheerfulness and Relaxation scales.

The data were subjected to a repeated-measures analysis of variance between massage and control groups to determine the experimental effects of massage on psychophysiological variables. Changes in before and after treatment scores were calculated to find the degree of significance. Results of this analysis of variance are
Table 1

Pain Patients' Pretest Group Means on Psychological Variables Outpatients: Massage and Control

<table>
<thead>
<tr>
<th>Variables</th>
<th>Massage</th>
<th>Control</th>
<th>SD-Ms</th>
<th>SD-Con</th>
<th>t</th>
<th>scores</th>
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<tr>
<td>Age</td>
<td>34.4</td>
<td>35.3</td>
<td>9.0</td>
<td>11.2</td>
<td>-0.19</td>
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<td>Sex</td>
<td>1.4</td>
<td>1.3</td>
<td>.5</td>
<td>.5</td>
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<td>H-R life events</td>
<td>374.0</td>
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<td>101.7</td>
<td>92.3</td>
<td>0.23</td>
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<td>POMS-Tension</td>
<td>45.9</td>
<td>50.4</td>
<td>8.2</td>
<td>5.9</td>
<td>-1.40</td>
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<td>52.8</td>
<td>44.8</td>
<td>11.1</td>
<td>7.0</td>
<td>1.92*</td>
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<tr>
<td>POMS-Fatigue</td>
<td>52.2</td>
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<td>10.2</td>
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<td>-0.96</td>
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<td>GWB-Total</td>
<td>45.9</td>
<td>39.1</td>
<td>21.0</td>
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<td>GWB-Worry Freedom</td>
<td>3.4</td>
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<td>GWB-Energy</td>
<td>8.6</td>
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<td>4.8</td>
<td>2.5</td>
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<td>GWB-Satisfaction</td>
<td>4.1</td>
<td>2.2</td>
<td>2.5</td>
<td>1.9</td>
<td>1.91*</td>
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<td>GWB-Cheerfulness</td>
<td>12.0</td>
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<td>5.3</td>
<td>4.3</td>
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<td>GWB-Relaxation</td>
<td>10.9</td>
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<td>6.7</td>
<td>4.5</td>
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<tr>
<td>GWB-Control</td>
<td>9.5</td>
<td>8.9</td>
<td>4.3</td>
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<td>DPQ-Activity</td>
<td>59.1</td>
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<td>20.7</td>
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<td>DPQ-Work Ability</td>
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<td>44.0</td>
<td>67.0</td>
<td>25.9</td>
<td>27.3</td>
<td>-1.93</td>
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* p < .05 level of confidence
Table 2

Pain Patients' Pretest Group Means on Psychological Variables Outpatients: Massage and Control

<table>
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<th>Variables</th>
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<th>Control</th>
<th>SD-Ms</th>
<th>SD-Con</th>
<th>t</th>
<th>scores</th>
</tr>
</thead>
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<tr>
<td>Age</td>
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<td>38.8</td>
<td>12.1</td>
<td>11.8</td>
<td>0.21</td>
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<td>1.2</td>
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<td>0.4</td>
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<td>H-R life events</td>
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<td>POMS-Depression</td>
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<td>45.1</td>
<td>5.1</td>
<td>7.4</td>
<td>-0.67</td>
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<tr>
<td>POMS-Anger</td>
<td>47.8</td>
<td>48.9</td>
<td>5.9</td>
<td>11.6</td>
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<td>POMS-Vigor</td>
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<td>13.8</td>
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<td>55.4</td>
<td>7.1</td>
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<tr>
<td>POMS-Confusion</td>
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<td>48.9</td>
<td>7.3</td>
<td>9.8</td>
<td>-0.49</td>
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<tr>
<td>GWB-Total</td>
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<td>11.3</td>
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<tr>
<td>GWB-Worry Freedom</td>
<td>2.4</td>
<td>4.3</td>
<td>2.4</td>
<td>4.1</td>
<td>-1.28</td>
<td></td>
</tr>
<tr>
<td>GWB-Energy</td>
<td>5.8</td>
<td>7.4</td>
<td>3.6</td>
<td>3.1</td>
<td>-1.06</td>
<td></td>
</tr>
<tr>
<td>GWB-Satisfaction</td>
<td>4.6</td>
<td>4.4</td>
<td>2.3</td>
<td>3.1</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td>GWB-Cheerfulness</td>
<td>10.3</td>
<td>15.3</td>
<td>4.1</td>
<td>4.6</td>
<td>-2.55*</td>
<td></td>
</tr>
<tr>
<td>GWB-Relaxation</td>
<td>7.3</td>
<td>11.2</td>
<td>3.4</td>
<td>6.1</td>
<td>-1.77</td>
<td></td>
</tr>
<tr>
<td>GWB-Control</td>
<td>8.0</td>
<td>10.0</td>
<td>2.2</td>
<td>3.6</td>
<td>-1.49</td>
<td></td>
</tr>
<tr>
<td>DPQ-Daily Activity</td>
<td>66.0</td>
<td>67.5</td>
<td>12.7</td>
<td>12.4</td>
<td>-0.27</td>
<td></td>
</tr>
<tr>
<td>DPQ-Work</td>
<td>76.5</td>
<td>77.5</td>
<td>22.9</td>
<td>17.6</td>
<td>-0.11</td>
<td></td>
</tr>
<tr>
<td>DPQ-Anger</td>
<td>61.5</td>
<td>55.0</td>
<td>19.5</td>
<td>19.6</td>
<td>0.74</td>
<td></td>
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<tr>
<td>DPQ-Social</td>
<td>70.5</td>
<td>51.0</td>
<td>25.9</td>
<td>29.1</td>
<td>1.54</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05 level of confidence
Table 3

Pain Patients' Pretest Group Means on Psychological Variables Outpatients: Massage and Control

<table>
<thead>
<tr>
<th>Variables</th>
<th>Massage</th>
<th>Control</th>
<th>SD-Ms</th>
<th>SD-Con</th>
<th>t scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMG</td>
<td>5.9</td>
<td>4.6</td>
<td>2.6</td>
<td>1.8</td>
<td>1.27</td>
</tr>
<tr>
<td>Temperature</td>
<td>91.0</td>
<td>88.6</td>
<td>2.5</td>
<td>5.9</td>
<td>1.20</td>
</tr>
<tr>
<td>Heart Rate</td>
<td>74.1</td>
<td>79.6</td>
<td>8.1</td>
<td>6.6</td>
<td>-1.66</td>
</tr>
<tr>
<td>BP - Systolic</td>
<td>119.0</td>
<td>125.0</td>
<td>12.1</td>
<td>12.1</td>
<td>-1.11</td>
</tr>
<tr>
<td>BP - Diastolic</td>
<td>75.8</td>
<td>79.4</td>
<td>7.3</td>
<td>7.2</td>
<td>-1.11</td>
</tr>
</tbody>
</table>

* p < .05 level of confidence

Table 4

Pain Patients' Pretest Group Means on Psychological Variables Outpatients: Massage and Control

<table>
<thead>
<tr>
<th>Variables</th>
<th>Massage</th>
<th>Control</th>
<th>SD-Ms</th>
<th>SD-Con</th>
<th>t scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMG</td>
<td>3.73</td>
<td>4.66</td>
<td>3.8</td>
<td>3.3</td>
<td>-.59</td>
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<tr>
<td>Temperature</td>
<td>86.94</td>
<td>81.50</td>
<td>6.1</td>
<td>8.2</td>
<td>1.68</td>
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<tr>
<td>Heart Rate</td>
<td>76.10</td>
<td>71.80</td>
<td>15.4</td>
<td>11.3</td>
<td>.82</td>
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<tr>
<td>BP - Systolic</td>
<td>124.70</td>
<td>121.6</td>
<td>13.3</td>
<td>8.0</td>
<td>.63</td>
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<tr>
<td>BP - Diastolic</td>
<td>78.0</td>
<td>79.2</td>
<td>9.1</td>
<td>4.7</td>
<td>-.37</td>
</tr>
</tbody>
</table>

* p < .05 level of confidence
found in Table 5. There was a significant reduction in EMG levels, POMS Tension, Depression, Fatigue, and an increase in Vigor and the DPQ Social Interest scale.

Scores on the SRE were compared by means of a t test, to determine whether life event changes could account for the differences between groups. This comparison yielded a mean of 374, with a standard deviation of 101.7 for the outpatient massage group, and a mean of 363.8, with a standard deviation of 92.3 for the outpatient control group. The inpatient massage group yielded a mean of 389.7 with a standard deviation of 100.3.

To further illustrate the changes between the groups, each group's pretest and posttest mean was plotted for each significant variable in Figures 1-6. These figures illustrate the similarities of the groups at pretesting and the differences at posttesting.
Table 5

Analysis of Variance Between Massage Treat and Control Groups for Change on All Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>df Btw Sf</th>
<th>df TMT</th>
<th>df TMTxS</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>F-Ratio</td>
<td></td>
<td>F-Ratio</td>
</tr>
<tr>
<td></td>
<td>Btw 5</td>
<td></td>
<td>TMT</td>
</tr>
</tbody>
</table>

Profile of Mood States:

| Tension (3.36) | 2.13 | (1.36) | 37.12 | (3.36) | 4.19 |
| Depression (3.36) | 1.54 | (1.36) | 19.2  | (3.36) | 3.22 |
| Anger (3.36) | 2.06 | (1.36) | 5.71  | (3.36) | 1.13 |
| Vigor (3.36) | 2.98 | (1.36) | 15.64 | (3.36) | 4.4  |
| Fatigue (3.36) | 1.15 | (1.36) | 22.36 | (3.36) | 4.39 |
| Confusion (3.36) | 0.06 | (1.36) | 16.19 | (3.36) | 0.9  |

General Well Being Scale:

| Totals (3.36) | 1.21 | (1.36) | 30.95 | (3.36) | 1.02 |
| Worry Free (3.36) | 0.22 | (1.36) | 9.78  | (3.36) | 0.81 |
| Energy Level (3.36) | 2.58 | (1.36) | 41.58 | (3.36) | 1.41 |
| Life Interest (3.36) | 2.3  | (1.36) | 11.36 | (3.36) | 0.42 |
| Cheer V Depress (3.36) | 12.49 | (1.36) | 24.69 | (3.36) | 1.66 |
| Relaxd V Tensn (3.36) | 1.96 | (1.36) | 25.5  | (3.36) | 2.25 |
| Control (3.36) | 0.03 | (1.36) | 12.39 | (3.36) | 2.12 |

Dallas Pain Questionnaire:

| Daily Activity (3.36) | 0.97 | (1.36) | 21.93 | (3.36) | 1.67 |
| Work/Leisure (3.36) | 2.9  | (1.36) | 8.26  | (3.36) | 1.37 |
| Anger/Depression (3.36) | 1.45 | (1.36) | 33.42 | (3.36) | 2.36 |
| Social Interest (3.36) | 1.73 | (1.36) | 15.84 | (3.36) | 5.47 |
| Emg (3.36) | 1.21 | (1.36) | 35.28 | (3.36) | 3.61 |
| Temperature (3.36) | 4.31 | (1.36) | 15.59 | (3.36) | 1.42 |
| Heart Rate (3.36) | 0.44 | (1.36) | 0.01  | (3.36) | 2.62 |
| BP - Systolic (3.36) | 0.1  | (1.36) | 0.001 | (3.36) | 1.67 |
| BP - Diastolic (3.36) | 0.42 | (1.36) | 5.52  | (3.36) | 2.68 |

* p > .05 level of confidence
Figure 1. Electromyograph values of all groups pretest and posttest.

Figure 2. Profile of Mood States - Tension Pretest and Posttest t scores.
Figure 3. Profile of Mood States - Depression
Pretest and Posttest t scores.

Figure 4. Profile of Mood States - Vigor
Pretest and Posttest t scores.
Pretest and Posttest t scores

Figure 5. Profile of Mood States - Fatigue

Pretest and Posttest Percentages

Figure 6. Dallas Pain Questionnaire - Social Interest

Pretest and Posttest Percentages
CHAPTER IV
DISCUSSION

The results of the current study strongly support the hypotheses under investigation. Further, the evidence points very clearly to the mind/body interaction as an effect of massage therapy. The study revealed a significant decrease in EMG levels in the experimental groups who received massage therapy and a lesser decrease in the control group who did not receive massage therapy. This supports the hypothesis that massage therapy can lead to a reduction in physiological variables. Hypothesis 1 regarding the psychological benefits of massage therapy was confirmed, in that the experimental subjects showed desirable and predicted changes in 5 of the 13 variables under consideration. Analysis of scores on the Holmes-Rahe instrument suggests that this difference is not attributable to the artifact effect of different levels of life stress endured by members of the four groups during and shortly before the period of intervention.

As with previous studies, the present study confirms the utility of massage therapy to reduce muscle tension. As the analysis of variance illustrates, the treatment modality was effective. The analysis of treatment plus group membership show a significant reduction in muscle tension.
The perception of tension by the subjects was also reduced, indicating a decrease in mental and physical strain.

Other mental/physical variables that changed significantly for the experimental group were fatigue and vigor. These seemingly opposing scales decreased and increased respectively, indicating that massage has a possibly rejuvenating effect on the body. The subjects also indicated less depression.

The DPQ scales -- Daily activity, leisure/work activities or anger/depression did not change. However, analysis of the scales suggest that patients' reflection on the pain is required to answer the DPQ questions. This dwelling on their pain and the limitation because of it may cause the perception of pain to increase, angering and depressing the patient. Therefore, no increase in activities would be expected, and no change in anger or depression could be anticipated as a result of massage therapy.

The relationships between our experiences, our feelings and our body chemistry are undoubtedly intricate and complex. To understand how massage therapy can affect one's physical, mental and emotional states, one needs to study the complementary branches of the autonomic nervous system. During the arousal state, the sympathetic nervous system causes a variety of internal processes, such as increased heart rate, shallow and quickened respiration, increased
metabolic rate, decreased general blood flow to the muscles, and so forth. These responses are constantly initiated as humans confront the stresses of everyday life.

Selye (1974) traced a path illustrating the extensive involvement of hormones in stress. This pathway is known as the hypothalamus-pituitary-adrenocortical axis and is an excellent description of the internal events of the body during psychological stress. The hypothalamus interprets incoming stressful stimuli, activating the hypothalamus-pituitary-adrenocortical axis which secretes the sympathetic or stress hormones into the blood stream or neurotransmitters along the neurons. The outcome is the "fight or flight" mechanism which readies the body to confront or flee the stressful stimuli.

The parasympathetic nervous system has a calming affect on the body. When the parasympathetic branch is activated, the body responds with a decreased or slowed heart rate and respiration, increased gastrointestinal mobility, and optimal mental activity. Biofeedback and meditation seek to achieve the hypometabolic state previously mentioned. Massage also elicits a parasympathetic response with slower and deeper respiration, a slower heart rate, a diminishing of muscular tension both in chronically congested areas and in overall muscle tone, an increase in blood flow through the visceral and skeletal muscles, and a more efficient use of available energy (Juhan, 1987).
The circularity of the human internal feedback/response system is such that it does not matter whether one begins with the cultivation of an inner mental calm and allows its influence to project out into the muscles, or whether on the other hand, one manipulates the sensory-motor reflexes in such a way as to decrease their normal tone and thus induce a calmer inner state. Considering that the skin and the central nervous system originate from the ectoderm of embryonic cells, one can easily see how sensory stimulation through massage can affect the central nervous system. Tactile experiences play an important role in the development and organization of the central nervous system through neural mapping. It is doubtful that this relationship ever stops.

Selye and others documented in 1976 that if this phenomenon persists throughout life, many life-threatening diseases, from peptic ulcers to atherosclerosis, can result. Selye proposes that the General Adaptation Syndrome (GAS) has three stages: the alarm reaction, the stage of resistance, and the stage of exhaustion. The alarm reaction is characterized by the activation of the sympathetic nervous system, which stimulates the production of epinephrine and norepinephrine from the adrenal medullae. Evidence shows that learning and memory acquired during Selye's stage of alarm reaction tends to be state-dependent (McGaugh, 1983). In the stage of resistance, psychosomatic
symptoms become particularly evident and troublesome. Symptoms could be anxiety, pain, headaches, or ulcers. The victim of these symptoms must now learn to adapt to their presence. The psychosomatic mode of adaptation is generally learned during a special state-dependent psychophysiological condition, and it continues because it remains state-bound or locked into that special psychophysiological condition even after the victim apparently returns to his normal mode of functioning. In the exhaustion stage, the organism loses control and many times death results (Selye, 1976). Constantinides and Carey (1977) concluded that in searching for ways to combat the diseases produced by too much hormone production, one of the most obvious targets would be to try to neutralize the hormonal excess, in other words, to find a chemical antidote. But the prevention of the basic causes will remain a task that lies beyond medicine's reach.

Is the answer for human overproduction of hormones found in medicine in the form of drugs or surgery? Could not sensory stimulation, in the form of positive sensory feedback, and a sense of self-control help to decrease some of these imbalances? In the current study, results indicate that the benefits of massage therapy include a decrease in tension, both physical and mental, objective and subjective, and in depression. Stress has been shown to inhibit the intellectual and physical functioning of the organism. With mental dysfunction, one cannot think clearly and thus bad
decisions are often made further increasing stress. With

dysfunctioning organs, proper maintenance is sacrificed,

which in turn also causes more stress on the body. Learned

helplessness and depression are often the results of too

much stress. As a result of massage, however, the vicious

cycle of stress-dysfunction-stress is broken. Massage

administers the caring touch and attention so important in
development. The positive sensory stimulation gives relief

from learned helplessness, and massage may further induce a

parasympathetic response or negate any sympathetic

responses. Consequently, enhanced relief is given by
decreasing the amount of stress hormones released into the
blood stream.

As previously stated, massage increases circulation

and, as a result of this increased circulation, parasympathetic hormones in the blood reach their target

sites more quickly, thus enhancing a calmer, hypometabolic

state. Tension is lessened as a result of these calming

effects. Depression is lessened because a break in the

stress cycle allows one to feel in more control and also by

the action that endorphins have on parts of the limbic

system and hypothalamus.

That parasympathetic nervous system has recuperative

effects on the organism, is supported by evidence in the

present study. As massage accesses the hypometabolic state,

the body is being replenished with nutrients and other vital
substances through increased oxygenated blood flow. As a result, the organism is getting much needed rest both mentally and physically, leading to an increase in vitality and a decrease in fatigue.

The increased vitality is also evident in an increase in social interest. As the organism is relieved from the effects of stress, the body and mind have more energy to expend on pleasurable pursuits. Greater emotional stability can also be attributed to a more zestful outlook on life, and can contribute to enhanced interest in life, and development of an optimistic attitude.

The present study illustrates the beneficial role massage therapy can play in the treatment for stress-related dysfunctions and disorders. It demonstrates a means of eliciting a relaxation response that is passive instead of active, as in biofeedback. This passive treatment provides healthcare professionals an alternative for use on patients who find active participation difficult. Importantly, massage therapy can help to show patients who are new to relaxation just how relaxation feels.
APPENDIX A

INFORMED CONSENT FORM
SUBJECT INFORMED CONSENT FORM

The purpose of this research project is to ascertain to what degree Massage Therapy assists in the recovery from chronic pain.

Subjects will be asked to complete Psychological questionnaires about mood, the pain's effect on activities and general well-being. The participants will be asked to complete these questionnaires before and after the Massage Therapy treatment program. Physiological measures will also be taken. These include measurement of muscles tension, pulse rate, blood pressure and peripheral temperature.

Random assignment of subjects will be used to obtain a Massage Therapy group and a group which receives standard medical and rehabilitation treatment.

The Massage Therapy group will receive a one hour massage twice a week for one month. The Massage Therapy will be administered by a Massage Therapist who has been certified by the American Massage Therapy Association in Swedish and Sports massage. The Therapist has also had four years of experience in the field of Massage Therapy.

The potential risks included in this project only involve some minor muscular soreness, not to exceed that experienced after a physical exertion (e.g., running or lifting weights). This soreness is caused by the release of metabolic waste products that are trapped in the muscle by a constant contraction of that muscle.

The benefits of this research project to the subject is increased flexibility, a flushing out of the system through the increased blood flow to previously restricted areas, and relief from the pain cycle which causes continuous sensations of pain in the affected areas.

"I agree to participate in this research project as it has been described to me. I know that I am free to discontinue my participation at any time during the session and to not answer any questions put to me. I understand that all my responses will be confidential."

SIGNATURE Date
Phone: ( ) -
APPENDIX B

THE HOLMES-RAHE SCHEDULE OF RECENT EXPERIENCE
Please check each item representing a situation you have personally experienced in the past six months.

Death of your spouse
Divorce
Marital separation
Jail term
Death of a close family member
Personal injury or illness
Marriage
Being fired at work
Marital reconciliation
Retirement
Change in health of a family member
Pregnancy
Sex difficulties
Gain of a new family member
Business readjustment
Change in financial status
Death of a close friend
Change to a different line of work
Change in number of family get-togethers
Mortgage or loan over $10,000
Foreclosure of mortgage or loan
Minor violation of the law
Change in responsibilities at work
Son or daughter leaving home
Trouble with in-laws
Outstanding personal achievement
Spouse beginning or stopping work
Beginning or ending school
Change in living conditions
Revision of personal habits
Trouble with your boss
Change in work hours or conditions
Change in residence
Change in schools
Change in recreation
Change in church activities
Change in social activities
Mortgage or loan of under $10,000
Change in sleeping habits
Change in eating habits
Change in number of arguments with spouse
Vacation
Christmas
APPENDIX C

PROFILE OF MOOD STATES
Below is a list of words that describe feelings people have. Please read each one carefully. Then fill in ONE circle under the answer to the right which best describes how you have been feeling during the past week including today.

The numbers refer to these phrases:

0 = Not at all
1 = A little
2 = Moderately
3 = Quite a bit
4 = Extremely

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Friendly</td>
<td>20. Panicky</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Tense</td>
<td>21. Hopeless</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Angry</td>
<td>22. Relaxed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Worn Out</td>
<td>23. Unworthy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Unhappy</td>
<td>24. Spiteful</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Lively</td>
<td>26. Uneasy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Confused</td>
<td>27. Restless</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Sorry for things done</td>
<td>28. Unable to concentrate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Shaky</td>
<td>29. Fatigued</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Listless</td>
<td>30. Helpful</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Peeved</td>
<td>31. Annoyed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Considerate</td>
<td>32. Discouraged</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Sad</td>
<td>33. Resentful</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Active</td>
<td>34. Nervous</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. On edge</td>
<td>35. Lonely</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Grouchy</td>
<td>36. Miserable</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>18. Blue</td>
<td>37. Muddled</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Energetic</td>
<td>38. Cheerful</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The numbers refer to these phrases:

0 = Not at all
1 = A little
2 = Moderately
3 = Quite a bit
4 = Extremely

39. Bitter
40. Exhausted
41. Anxious
42. Ready to fight
43. Good natured
44. Gloomy
45. Desperate
46. Sluggish
47. Rebellious
48. Helpless
49. Weary
50. Bewildered
51. Alert
52. Deceived

53. Furious
54. Efficient
55. Trusting
56. Full of pep
57. Bad-tempered
58. Worthless
59. Forgetful
60. Carefree
61. Terrified
62. Guilty
63. Vigorous
64. Uncertain
65. Bushed
APPENDIX D

GENERAL WELL-BEING SCHEDULE
This questionnaire contains questions about how you feel and how things have been going for you. For each question, mark (X) the answer which best applies to you.

1. How have you been feeling in general during the past month?
   - In excellent spirits
   - In very good spirits
   - In good spirits mostly
   - Up and down in spirits a lot
   - In low spirits mostly
   - In very low spirits

2. Have you been bothered by nervousness or your "nerves" during the past month?
   - Extremely so— to the points where I could not work or take care of things.
   - Very much so
   - Quite a bit
   - Some— enough to bother me
   - A little
   - Not at all

3. Have you been in firm control of your behavior, thoughts, emotions, or feelings during the past month?
   - Yes, definitely so
   - Yes, for the most part
   - Generally so
   - Not too well
   - No, and I am somewhat disturbed
   - No, and I am very disturbed

4. Have you felt sad, discouraged, hopeless, or had so many problems that you wondered if anything was worthwhile, during the past month?
   - Extremely so
   - Very much so
   - Quite a bit
   - Some— enough to bother me
   - A little bit
   - Not at all
5. Have you been under or felt you were under any strain, stress, or pressure? (during the past month)

___ Yes--almost more than I could bear or stand
___ Yes--quite a bit of pressure
___ Yes--some; more than usual
___ Yes--some--but about usual
___ Yes, a little
___ Not at all

6. How happy, satisfied, or pleased have you been with your personal life? (during the past month)

___ Extremely happy
___ Very happy
___ Fairly happy
___ Satisfied--pleased
___ Somewhat dissatisfied
___ Very dissatisfied

7. Have you any reason to wonder if you were losing your mind, or losing control over the way you act, talk, think, feel; or your memory? (during the past month)

___ Not at all
___ Only a little
___ Some, but not enough to be concerned or worried about
___ Some, and I am quite concerned
___ Yes, very much so, and I am very concerned

8. Have you been anxious, worried, or upset? (during the past month)

___ Extremely so--to the point of being sick or almost sick
___ Very much so
___ Quite a bit
___ Some--enough to bother me
___ A little bit
___ Not at all

9. Have you been waking up fresh and rested? (during the past month)
Every day | Less than half the time
---|---
Almost every day | Rarely
Fairly often | None of the time

10. Have you been bothered by any illness, bodily disorder, pains, or fears about your health? (during the past month)

All the time | Some of the time
Most of the time | A little of the time
A good bit of the time | None of the time

11. Has your daily life been full of things that were interesting to you? (during the past month)

All of the time | Some of the time
Most of the time | A little of the time
A good bit of the time | None of the time

12. Have you felt down-hearted and blue? (during the past month)

All of the time | Some of the time
Most of the time | A little of the time
A good bit of the time | None of the time

13. Have you been feeling emotionally stable and sure of yourself? (during the past month)

All of the time | Some of the time
Most of the time | A little of the time
A good bit of the time | None of the time

14. Have you felt tired, worn out, used up, or exhausted? (during the past month)

All of the time | Some of the time
Most of the time | A little of the time
A good bit of the time  None of the time

For each of the four scales below, note that the words at each end of the 0 to 10 scale describe opposite feelings. Circle any number along the bar which seems closest to how you have generally felt during the past month.

15. How concerned or worried about your health have you been?

<table>
<thead>
<tr>
<th>0</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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</tr>
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<tbody>
<tr>
<td>Not concerned</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very concerned</td>
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<tr>
<td>at all</td>
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</table>

16. How relaxed or tense have you been?

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<th>7</th>
<th>8</th>
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<th>10</th>
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</thead>
<tbody>
<tr>
<td>Very</td>
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<td>tense</td>
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<tr>
<td>relaxed</td>
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17. How much energy, pep, vitality have you felt?

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<th>7</th>
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<tbody>
<tr>
<td>No energy at all,</td>
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<td></td>
<td></td>
<td>Very energetic,</td>
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<tr>
<td>listless</td>
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<td></td>
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<td></td>
<td></td>
<td>dynamic</td>
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</table>

18. How depressed or cheerful have you been?

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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>cheerful</td>
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<tr>
<td>depressed</td>
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APPENDIX E

DALLAS PAIN QUESTIONNAIRE
Dallas Pain Questionnaire

Name______________________ Date of Birth____________

Today's Date______Occupation_____________________________________

Please read: This questionnaire has been designed to give your doctor information as to how your pain has affected your life. Be sure that these are your answers. Do not ask someone else to fill out the questionnaire for you. Please mark an "X" along the line that expresses your thoughts from 0 to 100 in each section.

Section I: Pain and Intensity

To what degree do you rely on pain medications or pain relieving substances for you to be comfortable?

None Some All the time

0% (_____:_____!:_____:_____:_____:_____:) 100%

Section II: Personal Care

How much does pain interfere with your personal care (getting out of bed, teeth brushing, dressing, etc.)?

None (no pain) Some I cannot get out of bed

0% (_____:_____!:_____:_____:_____:_____:) 100%

Section III: Lifting

How much limitation do you notice in lifting?

None Some I cannot lift anything

(I can lift as I did)

0% (_____:_____!:_____:_____:_____:_____:) 100%
Section V: Walking

Compared to how far you could walk before your injury or back trouble, how much does pain restrict your walking now?

I can walk the same Almost the same Very little I cannot walk

0% (____:____:____:____:____:____:____) 100%

Section V: Sitting

Back pain limits my sitting in a chair to:

None, pain same as before Some I cannot sit

0% (____:____:____:____:____:____:____) 100%

Section VI: Standing

How much does your pain interfere with your tolerance to stand for long periods?

None same as before Some I cannot stand

0% (____:____:____:____:____:____:____) 100%

Section VII: Sleeping

How much does pain interfere with your sleeping?

None same as before Some I cannot sleep at all

0% (____:____:____:____:____:____:____) 100%

D___ x 3 ___%

Section VIII: Social Life

How much does pain interfere with your social life (dancing, games, going out, eating with friends, etc.)?

None same as before Some No activities total loss

0% (____:____:____:____:____:____:____) 100%
Section IX: Traveling
How much does pain interfere with traveling in a car?

None          Some         I cannot travel
same as before

0% (________:________:________:________:________:________) 100%

Section X: Vocational
How much does pain interfere with your job?

None          Some         I cannot work
same as before

0% (________:________:________:________:________:________) 100%

W x5 __% 

Section XI: Anxiety/Mood
How much control do you feel that you have over demands made on you?

(No change)
Total          Some         None

100% (________:________:________:________:________:________) 0%

Section XII: Emotional Control
How much control do you feel you have over your emotions?

(No change)
Total          Some         None

100% (________:________:________:________:________:________) 0%

Section XIII: Depression
How depressed have you been since the onset of pain?

Not depressed significantly                          Overwhelmed by Depression

0% (________:________:________:________:________:________) 100%

A __ x5 ___ %
Section XIV: Interpersonal Relationships

How much do you think your pain has changed your relationships with others?

Not Drastically
Changed Changed

0% (________:________:________:________:________:________) 100%

Section XV: Social Support

How much support do you need from others to help you during this onset of pain (taking over chores, fixing meals, etc.)?

None All
needed the time

0% (________:________:________:________:________:________) 100%

Section XVI: Punishing Response

How much do you think others express irritation, frustration or anger toward you because of your pain?

None Some All
the time

0% (________:________:________:________:________:________) 100%
S x5 ___%
REFERENCES


