

THE MMPI AS A PREDICTIVE INSTRUMENT FOR SUCCESS
OF TREATMENT OF PATIENTS WITH LOW BACK PAIN IN A
MULTIDISCIPLINARY TREATMENT CENTER

by

Nancy A. Seres, R. N. B.S.N.

A Field Study

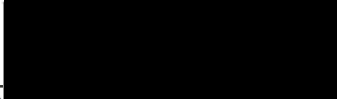
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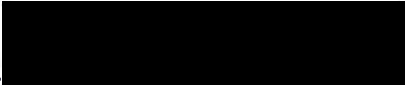
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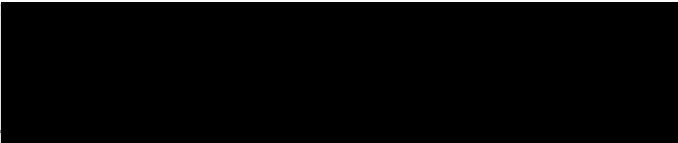
Marie Berger, M. S., Assistant Professor of Medical and Surgical Nursing
Field Study Advisor



Julia Brown, Ph.D., Associate Professor of Sociology
1st Reader



May Rawlinson, Ph.D., Associate Professor of Nursing
2nd Reader



John M. Brookhart, Ph.D., Professor of Physiology
Chairman, Graduate Council

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Chapter I

Introduction

Chronic low back pain is not only a major national health problem, but is also becoming a social and economic problem of great dimension. William Halliday (1973) cited several statistics provided by the Washington State Department of Labor and Industries which indicate the enormity of the problem. By the Department alone, some 100 million dollars annually are spent in the field of Workmen's Compensation. Some 40% of that budget goes to less than one-half of 1% of the workmen covered. Eighty-five percent of these workmen have low back pain as a permanent impairment and as their presenting complaint. Approximately 60% of all industrial injuries affect the low back. Similar figures for other parts of the United States are cited by Aiken (1952), Beals and Hickman (1972), Sternbach (1972), Wifling (1973), and Bonica (1974).

Various centers in the United States have been opened to help in the rehabilitation of patients with chronic pain problems. In order to assess the success of such programs, some preliminary questions need to be asked. These might include: are all patients with chronic pain problems "good" candidates for such a program? Is there a diagnostic and/or predictive instrument which can be used to discriminate between those patients who will benefit most and those who will benefit least? This study will attempt to answer these questions.

Review of Literature

While the primary focus of this literature review is on the problem of low back pain, it will also include a brief description of the present understanding of pain perception, the subjective components of pain, and the importance of learning theory as a conceptual framework to understand how a chronic pain problem may develop.

Theories of Pain

Considering the enormity of the problem of low back pain, there seems to be surprisingly little research regarding pain, and even less regarding back pain. There are, however, a number of theories of the pain mechanism and the pain experience (Melzack, 1973).

Five major theories of pain are considered here, the affect theory, the specificity theory, the pattern theory, the gate theory, and the learning theory. The first theory of pain dates as far back as Aristotle. He believed pain to be a "state of feeling, an emotion, the antithetic to pleasure and the epitome of unpleasantness." (Clawson, Bonica, & Fordyce, 1972, p. 8) This theory was accepted until the mid-nineteenth century (Clawson et al., 1972).

More recently the specificity theory of pain has attained the greatest acceptance. It states that there are specific receptors for the transduction of specific kinds of stimuli. Less well accepted is the pattern theory. It suggests that information generated by skin receptors is coded in the form of patterns of nerve impulses and

transmitted to the higher centers in the brain (Melzack, 1973). The most recent explanation of the pain phenomenon is the gate theory of pain developed by Melzack and Wall (1958). Briefly, this theory explains the pain mechanism in terms of a gate control system which modulates sensory input from the skin before it reaches the higher centers of the brain to evoke pain perception and response.

The learning theory is gaining increasing acceptance in the study of chronic pain. Bonica and Fordyce (1974) make a point that expressions of pain can take on the characteristics of habits. They maintain that the way an individual expresses pain, either as responses or behaviors, ought to be looked upon as being influenced by learning. Bonica (1974) maintains that operant mechanisms are working in the development of chronic pain behavior. This chronic pain behavior includes decreased activity, no exercising, lying down most of the day, and an increase in the amount of pain medication taken. The process begins with a noxious stimulus to some part of the body which causes the individual to respond in a particular manner. If this response is reinforced favorably, the individual will continue to respond in that same manner. Bonica goes on to say that the individual will continue his response as long as the consequences are favorable. Such responses or behaviors may eventually become independent of the underlying pathology. This points out the importance of how "significant others" in an individual's life respond to, and what they expect from, the person experiencing pain. This view is supported by other authors

such as Clawson et al. (1972), Kirkpatrick (1972), Mechanic (1952), Abram (1972), Blackwell (1967), and Kasl (1966).

Subjective Components of Pain

Pain is a complex phenomenon that cannot be explained entirely by any of the aforementioned theories. It is a subjective personal experience, a function of the whole individual (Melzack, 1973).

The subjective component of the pain experience is a very important one. The literature strongly supports the idea of pain as a perceptive or psychological experience influenced by an individual's past history, the meaning he gives to the pain and/or the situation producing it, his emotional status, and numerous other factors (Merskey & Spears, 1967; Murray, 1971; Ludwig & Adams, 1968; Yochelson, 1966; Szasz, 1970).

Rosenbaum and Steinmilber (1973) present data from four case studies which indicate that in each case, past and present experiences affected the individual's complaint of back pain and that regardless of the physical treatment, the patient's pain was unaltered or worse. As a result of these findings, the authors suggest a more comprehensive form of treatment of pain than by physical modalities alone. While the number of cases they consider is small, the data presented on each patient appear very comprehensive. Kiely (1972) agrees with the importance of present and past experiences in the pain experience. He maintains that there is little correlation between how one responds to an injury and certain other psycho-social factors, such as life-setting.

Other authors add support to the statement that "the total pain experience is composed of the pain perception, the associated sensations, and the emotional and psychological reactions consequent thereto" (Clawson et al., 1972, p. 8). Benedetti (1964) describes pain as "normal psychic phenomenon...a kind of information which inaccurately reflects temporal and spatial parameter of some external stimulus" (p. 256). He goes on to say that pain accurately registers emotional reactions of the individual to his environment and that these reactions become pathological only when they are not in proper perspective to the stimulus. George Engel (1959) goes even further in his discussion of psychological aspects of pain when he proposes that "once the psychic organization necessary for pain has evolved, the experience of pain no longer requires peripheral stimulation to be provoked, just as visual and auditory sensation occur without sense or organ input" (p. 916). This same type of phenomenon might be evidenced in pain sensations that develop in the absence of detectable organic pathology (Cassell, 1972). Cassell maintains that this happens when the psychosocial milieu presents a greater threat to the person than may be resolved by traditional mental defenses. In such situations an individual's psychological defenses become more concrete and primitive in nature thus producing an apparent dehumanization of the threatening situation. The individual becomes more acutely aware of his own body which sets a foundation for the development of unconscious fantasies involving bodily assault and gives rise to psychosomatic pain. Cassell bases

his ideas on the results of his study of body perception and somatic symptoms. As part of the psychological examination of patients with pain whose physical examination is essentially normal, Cassell uses a projective psychological test, similar to the Rorschach, which is relatively new and for which statistical norms have not yet been developed. The test consists of 12 configurations which have anatomical connotations referable to particular organs. The pictures range from highly abstract forms to ones which are highly structured with regard to anatomical content. Thus far, Cassell has found this test particularly helpful in eliciting somatic perceptions of an individual not detected in more standard interviewing techniques.

As has been well demonstrated by the studies of Antonovsky (1967), Sternbach and Tursky (1965), Twaddle (1969), and Zborowski (1969), culture plays an important part in the pain experience. Probably the most extensive and well known studies were carried out by Mark Zborowski (1969). He studied the pain experience in Jewish, Irish, Italian, and "Old American" people. He documented definite differences in the degree of pain perception and pain reactions in persons of different cultural backgrounds. Similar results were found by the other authors mentioned above.

Effectiveness of Treatment for Low Back Pain

Historically, attempts at treating low back pain have been primarily surgical, often in conjunction with some form of conservative medical therapy, such as traction, bedrest, or physical therapy (Finneson, 1973). Studies indicate that while surgery may be

successful, by removing a herniated disc or by achieving a solid spinal fusion, it is often not successful in alleviating the patient's complaint of back pain (Levit, 1973; Fox, 1974; Nagi, Burk, & Potter, 1965).

Recently, results of several studies have indicated that the Minnesota Multiphasic Personality Inventory (MMPI) might be a useful tool in determining the advisability of treatment for patients suffering from low back pain. One such study was conducted by Hanvik (1965). The purpose of his study was to determine whether the MMPI could be used as a tool to differentiate between low back patients for whom definite evidence of organic pathology existed and those for whom it did not. He found that there were statistically significant differences between the two groups on six of the clinical scales, namely Hypochondriasis, Depression, Hysteria, Psychopathic Deviate, Psychasthenia, and Schizophrenia. The functional patients scored higher on all scales than did the organic patients. The profile plotted for the functional group was "neurotic in type, showing the 'conversion-V' configuration, which features elevations on Hypochondriasis and Hysteria, with Depression relatively low and a mild rise on Psychasthenia" (Hanvik, 1956, p. 504).

Since 1956, numerous other studies have used the MMPI to determine diagnosis and treatment for patients suffering from chronic low back pain. For example, a comprehensive evaluation and followup study by Beals and Hickman (1972) of 180 industrially injured patients found that the presence of a solid stable fusion was not the most

important factor in determining the rehabilitation of the patient, that is, the patient's return to work. Rather, their findings support the idea that factors, other than physical, are involved in the patient's recovery. They did find that the clinical results of the surgery correlated with the individual's personality traits as measured by the MMPI. Similar results were found by Stauffer and Coventry (1972) who studied 177 patients who had undergone posterolateral lumbar spine bone grafting. While they found a high correlation between the presence of a solid fusion and good clinical results (which they defined as relief of pain and return to work), they also found that a fairly large number of patients still experienced pain, regardless of what the x-ray showed about the solidarity of the fusion. They found a significant correlation between those patients who prior to surgery had shown definite psychoneurosis or personality disorders on the MMPI.

Other researchers have given evidence of an elevation in the neurotic triad in patients with a long history of back pain. For example, Phillips (1964) found that "low back syndrome" patients had a greater elevation on the neurotic triad of the MMPI than did the patients who had extremity injuries. When Wifling, Klonoff, and Kokan (1973) studied 26 male patients in a Veteran's hospital, they found that the MMPI discriminated between those patients who had "successful" results from surgery and those who did not. Success was defined as increased physical activity and return to work.

Sternbach, Wolf, Murphy, and Akeson (1972) studied 117 patients with a common complaint of low back pain. All patients had an elevated

neurotic triad on the MMPI. The composite profile showed a T score of 70 and above (two standard deviations above the mean) for these scales. Sternbach et al. (1972, p. 2) referred to these patients as the "low-back losers." All of the "low-back losers" had complained of low back pain for at least six months. In a second study of 68 patients, Sternbach et al. (1973) demonstrated similar findings.

Because it has been shown that patients with a long history of low back pain have elevated scores (70 and above) on the neurotic triad, the MMPI is being used by some physicians as a diagnostic tool. That is, the MMPI is used for screening patients for low-back surgery and for diagnosis of patients prior to admission to certain pain centers. Bonica (1974), for example, used it in the diagnosis of all patients admitted to the Pain Clinic of the University of Washington. Wiltse and Rocchio (1973) report they used the MMPI for screening patients for low back surgery (lumbar laminectomy) or chemonucleolysis. One hundred and thirty patients were given the MMPI pre-operatively and again one year postoperative. The hypochondriacal and hysteria scales on the MMPI were found to demonstrate "substantial promise as differentiators of patients reporting good symptom relief as a result of chemonucleolysis from those reporting little or no relief of low back pain" (p. 26). Similar findings were reported for the lumbar laminectomy group of patients. Those patients with a T score of 85 or above on the hypochondriasis and hysteria scales were reported to have a 10% chance of obtaining a good functional recovery. Patients with T scores of 75 to 84 were reported as having a 16% chance of a good recovery,

and those with a T score of 65 to 74, 39% chance of a good recovery. The authors did not document validity of the MMPI profiles of the patients studied. For patients who score 85 or above on the hypochondriacal and/or hysteria scales, surgery has not been found to be effective in relieving their symptoms (Wiltse & Rocchio, 1973). For such persons other forms of treatment, such as behavior modification, seems to offer a better chance for improvement.

The literature demonstrated that the MMPI is a useful tool for discriminating between low back pain patients who are more likely and less likely to have successful results from surgery. Although it has been recommended that patients with a T score of 70 to 75 or above on the hypochondriasis and hysteria scales in particular, of the MMPI be treated in a multidisciplinary pain treatment center (Melzack, 1973; Bonica, 1974; Fordyce, 1974; Lawson et al., 1972), this researcher has been unable to find any research assessing the MMPI as a predictive tool for success of treatment of the low back patient in such a center.

Statement of the Problem

The MMPI has been used to predict the success of surgery for patients with low back pain, but for those patients for whom surgery is not indicated, treatment in a multidisciplinary treatment center is recommended. There is however, little documentation on the success of treatment of these patients in such a center or on diagnostic instruments available to predict the patient's success in such a program. The literature review demonstrated that the hypochondriasis

and hysteria scales of the MMPI were particularly useful in discriminating between low back pain patients who are more likely and less likely to have successful results from surgery. The problem then is: are the MMPI scales of hypochondriasis and hysteria useful in discriminating between low back pain patients who are more likely and less likely to have successful results in a multidisciplinary treatment center?

Purpose

The purpose of this study is to evaluate the usefulness of the MMPI for predicting the success of chronic low back pain patients in a multidisciplinary treatment center.

Hypothesis

The MMPI has predictive validity for the success of treatment of low back pain patients in a multidisciplinary treatment center. Stated more specifically, the hypothesis is: patients with high scores on the MMPI hypochondriasis and hysteria scales will perform less well on designated physical exercises following treatment in a multidisciplinary treatment center than will patients with low scores on these scales.

Chapter II

Methodology

Setting

The setting for this investigation was the Portland Pain Rehabilitation Center. The pain center was established to help people suffering from pain who had not been helped by the usual forms of therapy. Many different kinds of pain are treated at the pain center, including low back pain, post-laminectomy and fusion pain, upper back and neck pain, cervical and lumbar arthritis, headache, postoperative pain (i.e. chest wall pain), facial and other neuralgias, amputation pain and phantom limb pain, post-burn pain, and others. Approximately 65-70% of the patients treated in the pain center have low back pain. Of the patients who complete the entire program, approximately 80% return for follow-up evaluation three months after discharge.

The program which the patients participated in was multidisciplinary.

"There is a tremendous amount of interdisciplinary overlap in the diagnosis and treatment, complemented by bi-weekly multidisciplinary staffings which involve extensive therapeutic treatment planning for each individual patient. The patient's individual needs and progress are evaluated and re-evaluated throughout their hospitalization" (Seres and Newman, 1974, p.3).

Staff members include a neurosurgeon, clinical psychologists, a

physiatrist, registered nurses, nursing assistants, occupational therapists, physical therapists, a biofeedback technician, and a consulting neurologist.

The major program areas include the following:

1. Education: Patients participate in a daily lecture discussion designed to teach each patient anatomy and physiology and the psychology of chronic pain.
2. Physical Therapy: Each patient is seen by a licensed, trained physical therapist on an average of three times a day.
 - (a) An individual therapy session is designed to teach the patient proper exercises and body mechanics.
 - (b) Daily hydrotherapy is provided.
 - (c) Posture and body mechanics classes are conducted in small groups each day in which patients are taught the proper use of body mechanics and use of the painful areas.
 - (d) Videotape feedback sessions of patient's posture and body mechanics are used for weekly patient education and measurement of the patient's improvement throughout the program.
3. Occupational Therapy: The proper use of body mechanics and exercises in activities that the patients will be performing in their daily lives is stressed in Occupational Therapy.
4. Biofeedback: Biofeedback training sessions are held individually with patients three times a week.

5. Jacobson's Systematic Relaxation Training Sessions: Patients attend two Jacobson's systematic relaxation training sessions a day, during which they receive specific and detailed instructions in systematic muscle relaxation by the Jacobson method.
6. Autogenic Training Sessions: All patients receive a daily autogenic training session. Here they are taught both the principles of extended deep muscle relaxation and physiological control.
7. Behavior Modification: A central aspect in the total treatment process involves the application of behavior modification. Individual programs are designed by the staff psychologist for the reduction of pain medication, elimination of hysterical behavior, depression, impotency, and other aspects of the patient's overall symptoms secondary to his chronic pain problem.
8. Transcutaneous Nerve Stimulation: Nerve blocks and other electrical and chemical methods by which pain and pain pathways are masked and/or blocked are utilized on an individual basis with respect to the patient's specific needs. (Seres and Newman, 1974, pp.3-5).

Subjects

The subjects for this study were selected from the first 100 patients with chronic low back pain to complete the present PPRC program and to return for followup evaluation. (Eighty-one per cent of the patients who completed the program returned for followup evaluation.) Of the 100 patients who returned, there were only 15 who met the necessary

criteria and had what might be considered a "normal" MMPI profile with scores on the hypochondriasis and hysteria scales of 70 or below. These subjects were selected as Group I and were called the "normal" group. There were also 15 patients who met the necessary criteria but had very high scores on either the hypochondriasis or hysteria scales of the MMPI, i.e. scores of 90 or above. In order that there might be an equal number of patients in each group and no overlap in the scores of the hypochondriasis and hysteria scales, this group of subjects was selected as Group II, and called the "abnormal" group.

Selection criteria to be included in the study were as follows:

1. Completion of a consecutive three-week in-patient program at the PPRC.
2. Return for followup checkup three months after discharge from the program.
3. Between the ages of 30 and 60.
4. A chief complaint was low back pain.
5. Diagnosed as benign chronic low back pain (chronic defined as pain of at least six months duration).
6. Prior treatment for low back pain by surgical intervention and other physical means.
7. One or more surgeries on the low back to relieve pain.
8. Able to read.
9. Open claims with Workmen's Compensation.
10. Valid MMPI profiles.

Education, occupation, and length of time off work were uncontrolled

as were cultural, social, and economic background variables.

The major difference between the two groups was their scores on the hypochondriasis (Hs) and hysteria (Hy) scales of the MMPI. They were widely separated on these scales, with a 23-point difference between their scores on Hy and a 34-point difference on the Hs scale. Group I was well within the limits of "normal" and Group II was considerably above the limits of "normal." The groups were similar with respect to age, number of surgical procedures prior to admission to the PPRC, and duration of illness. (See Table 1) Members of Group I, the "normal" group, had an average age of 41 years, averaged 1.2 surgeries prior to admission to the PPRC, and had had their pain problem an average of $4\frac{1}{2}$ years. There were 7 men and 8 women in the group. Members of Group II, the "abnormal" group, were on the average 45 years of age, averaged 1.4 surgeries prior to admission to the PPRC, and had had their problem an average of 6 years. There were 11 men and 4 women in this group.

Measure of the Dependent Variable

An increase in exercise has been shown to correlate with a decrease in pain behavior, and has been suggested as one objective method of determining success in a pain program (Fordyce, 1974; Bonica, Proacci, and Pagni, 1974; Seres & Newman, 1973). Physical mobility and flexibility measures are commonly utilized as criteria of improvement for chronic low back pain patients. Subjective expressions of pain by the patient are less reliable measures of pain behavior (Fordyce, 1974; Bonica, Procacci, and Pagni, 1974; Seres & Newman, 1973).

Table 1. Demographic Data for each group. Group means for age, duration of illness in years, number of surgeries prior to admission to the PPRC, Hypochondriasis (Hs) score on the MMPI, and Hysteria (Hy) score on the MMPI.

Group	Mean Age	Mean duration of illness (yrs)	Mean number of Surgeries	Mean Hy Score	Mean Hs Score
I	41	4.5	1.2	65	64
II	45	5.8	1.4	88	98

Seres and Newman (1974, 1975) have demonstrated parallel improvement in the three Williams' Flexion Exercises of "long-sitting to toes," "straight leg raise," and "knee to chest" in pain patients while on the unit and on followup evaluation.

Performance of the exercise "long-sitting to toes" was used as the dependent variable in this study. This exercise is similar to a sit-up and increased leg and back mobility. The exercise uses the muscles and body movements necessary to perform "straight leg raise" and "knee to chest" also. (See Figure 1.)

The subject was not evaluated on endurance, that is, on the number of times he could do the exercises, but rather on the amount of change in the number of inches from fingertips to toes. Improvement of performance, therefore was noted if he decreased the distance in inches from his fingertips to his toes. He did less well if there was no change in the number of inches from fingertips to toes or an increase in the number. Each subject was evaluated at the same time of day on admission, discharge, and three-month followup by the same physical therapist.

Measure of the Independent Variables

The independent variables in this study were the personality traits of hypochondriasis and hysteria as measured by the MMPI. These variables have been reported in the literature as factors which affect pain expression and reaction to treatment (Sternbach et al., 1972; Beals & Hicman, 1972; Wiltse & Rocchio, 1973).

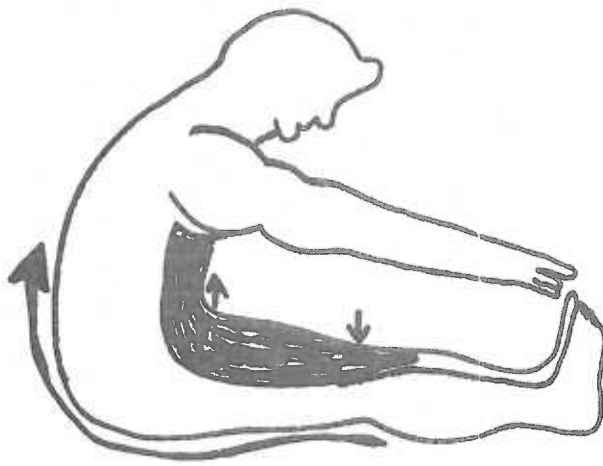


Figure 1. Williams' Flexion Exercise:
Long-sitting-to-toe

The MMPI is a self-administered test of 566 items and is appropriate for any cooperative individual, sixteen years of age or older. The subject selects the appropriate answer from the following categories, "yes", "no", or "cannot say". Included in the test are validity scores, (L, F, and K), which assess the honesty of the individual's replies. The lie score (L) is a measure of the degree to which a subject may attempt to falsify his scores by choosing answers which are most socially acceptable. The validity score (F) is a check on the validity of the entire record. A high F score suggests the other scales are likely to be invalid because the subject was careless or unable to comprehend the test, or because extensive scoring or recording errors were made. A low F score is a reliable indication that the subject's responses were rational and relatively pertinent. The K score is essentially a correction factor to sharpen the discriminatory power of the clinical variables measured by the Inventory. The K score is thought of as a measure of test-taking attitude. A high K represents defensiveness that verges upon more "normal" appearance. A low K indicates that a person tends to be overly candid and open to self-criticism and attempts to make a bad impression (Hathaway & McKinley, 1951).

For this study, an MMPI profile was considered valid if the F/K difference was ± 15 or less. The F/K difference has been used as an indication of "faking" good or bad. When the difference

is in the positive direction it is suggestive of a conscious attempt to look bad or to exaggerate illness. When it is in the negative direction it suggests an effort to look good and to deny emotional problems (Carson, 1960).

In the present study, the MMPI scales of hypochondriasis and hysteria were utilized. The hypochondriasis (Hs) scale is a measure of the amount of abnormal concern about bodily functions. Persons with high Hs scores are unduly worried over their health (Hathaway & McKinley, 1951). The hysteria (Hy) scale consists of items which fall into two clusters, one of rather specific somatic complaints, the other of items which deny any emotional or interpersonal difficulty. In normal individuals these two clusters show no tendency to occur together, whereas in individuals with high Hy scores, they seem to be closely associated. These individuals tend to be naive and self-centered in outlook. They tend to be manipulative and, on the whole, lack insight into their own difficulties (Carson, 1960).

Reliability

Hathaway and McKinley, Cottle, and Holzberg and Alessi report test-retest reliability co-efficients of .80, .81, and .67, respectively for the hypochondriasis scale, and .57, .72, and .87, respectively for the hysteria scale (Hathaway & McKinley, 1951).

Validity

Regarding the validity of the MMPI, a high score on a scale has been found to predict positively the corresponding clinical diagnosis or the presence of a trait to an abnormal degree in an individual in more than 60% of the cases reported on (Hathaway & McKinley, 1951; Gilberstadt & Duker, 1965). The MMPI scales of hypochondriasis and hysteria have been shown to have high predictive validity for low back patients in determining the outcome of the surgical procedures on their back (Beals & Hickman, 1972; Stauffer & Coventry, 1972; Wiltse & Rocchio, 1973).

Design

The design of this study is "correlational." This study explores the possibility of a correlation between personality traits as measured by the MMPI and an individual's performance on a physical exercise after a course of treatment at the PPRC.

The groups consisted of a "normal" group and an "abnormal" group. Group I was considered the "normal" group and consisted of subjects who scored 70 or below on the hypochondriasis and hysteria scales of the MMPI. Group II was considered the "abnormal" group and consisted of subjects who scored 90 or above on the same scales. The groups were evaluated on the Williams' Flexion Exercise of "long-sitting-to-toe" on admission to the PPRC, at discharge, and again at the followup evaluation, three months after discharge from the center.

A limitation of this design is that it does not as clearly as an experimental design indicate the directionality of the relationship. Also, the independent variables, those of personality traits, did not lend themselves well to manipulation. An advantage of this "correlational" type of design is that it can, relatively inexpensively, rule out simple, general, causal hypotheses, leaving those which survive to be further investigated through the more controlled experimental design (Campbell & Stanley, 1963).

Procedure

On the day of admission to the PPRC each patient was given an MMPI to complete. The administration of the test was supervised by the Director of the Neuropsychological Services at the center. He also evaluated and interpreted all the MMPI responses.

Those patients who had a valid MMPI with a T-score of 70 or below on both hypochondriasis and on hysteria were placed in Group I. Those with a T-score of 90 or above on either or both scales were placed in Group II, the "abnormal" or pathological group. The patients with invalid MMPI's or with T-scores between 71 and 89 on either or both hypochondriasis or hysteria scales were not included in the study.

Each patient was also seen by a physical therapist on admission. During the physical therapist's evaluation, baseline data on the "long-sitting to toe" exercise were taken for each

patient.

All patients included in the study then completed a three week program at the PPRC. On the day of discharge, they were evaluated by the physical therapist and measured for the "long-sitting to toe" exercise.

All patients were asked to return to the PPRC in three months for another evaluation. At that time they were once again measured for the "long-sitting to toe" exercise. During the three month period from discharge until followup, the patients have no contact with or treatment from the PPRC.

Analysis of Data

An analysis of variance, using a two-factor design with repeated measures was used to compute the data. An advantage of this statistic is that all the data are treated simultaneously. In analysis of variance, the interaction of all groups and all trials (evaluation periods) is taken into account (Edwards, 1967; Downie & Heath, 1965). In the simple analysis of variance used in this study, the variation of group means from total or grand means of both groups was analyzed. This is referred to as "between groups" variance. Also, the average variability of scores in each group at the three evaluation periods was analyzed. This is referred to as "within groups" variance.

Chapter III

Results and Discussion

This study involved two groups of patients selected from 100 low back pain patients who had completed the in-patient program at the PPRC. The patients were representative of the low back patients treated at the center in respect to age, duration of illness, and number of surgeries prior to entering the PPRC. They did, however, represent two extremes of patients in respect to personality traits as measured by the MMPI scales of hypochondriasis and hysteria.

It is of interest to note that of 100 patients originally reviewed for the study, over one-third had invalid MMPI's. As has been discussed, an invalid MMPI usually indicates that an individual is trying to falsify the test in order to look good or look bad (Hathaway & McKinley, 1951). This finding raises several questions. Did this problem arise in this study due to the unique characteristics of the population? Patients suffering from chronic low back pain have been referred to as difficult to manage, and as "the low-back loser" (Sternbach, 1973; Jacobs, 1973). Might it possibly be a characteristic of these patients to attempt to falsify test scores for one reason or another, such as to keep open a claim with the Workmen's Compensation carrier? Further research seems indicated in this area.

Figure 2 illustrates the profiles of the two experimental groups. The profiles were interpreted by the Director of Neuropsychological Services at the PPRC. The profile interpretations were based on

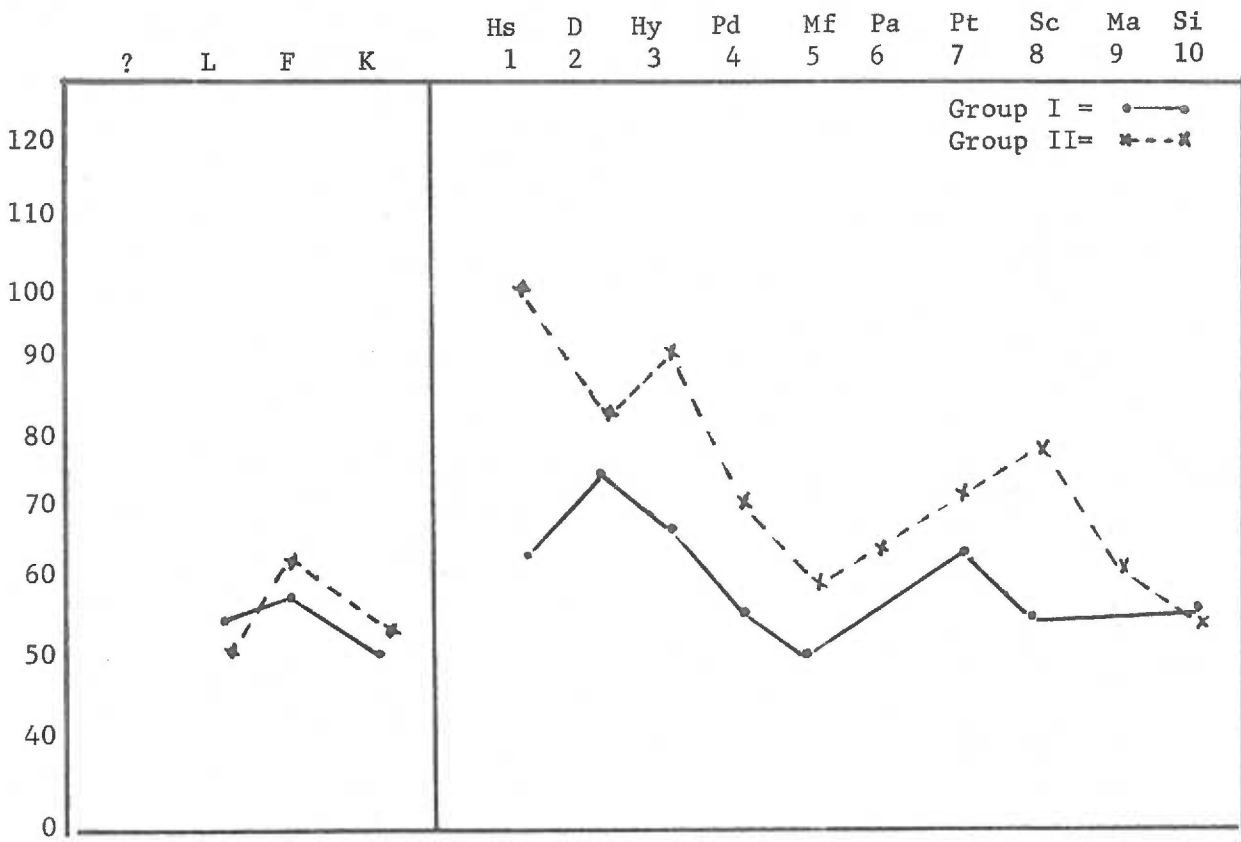


Figure 2. Composite MMPI profiles of Group I and Group II showing the validity and clinical scales.

blind composite mean profiles with no interpretations of scale 5, the masculinity-femininity scale, or scale Si, due to the composite nature of the data.

Group I presents a relatively normal MMPI profile. The validity scales of the profile show an appropriate amount of openness and cooperativeness in test-taking attitude and behavioral style. The clinical profile shows an elevation of scale 2, the depression scale, of a moderate nature, basically associated with situational depressive reaction. There are insignificant elevations of the hypochondriasis (scale 1) and hysteria (scale 3) scales as well as on the psychasthenia scale. Persons producing mild elevations on these above mentioned scales typically show evidence of chronic physical illness or concern of a mild nature as well as some anxiety and rumination about their present predicament. This type of profile might be expected if one has suffered a chronic pain problem for several years.

The test-taking attitude of individuals in Group II is one of open cooperativeness as shown in the validity scales which have an appropriate K/F ratio. The profile shows a marked elevation on Scales 1 (hypochondriasis), 3 (hysteria), 2 (depression), and 8 (schizophrenia) respectively. The diagnosis for these patients, based on the clinical scales, would most likely be psychoneurosis conversion hysteria with depression or psychophysiologic reaction. Complaints and symptoms of individuals producing these profiles frequently include back pain, chest pain, headaches, tension, weakness, and tiredness. There were more male patients in this group. The patients in Group II were ill

1.3 years longer, were about four years older, and had 0.2 more surgeries than the patients in Group I. The patients in Group II would be considered the more difficult patients to treat.

As might be expected from the literature (Sternbach, 1972; Sternbach, 1973; Beals & Hickman, 1972; Wiltse & Rocchio, 1973) a large number of patients, approximately 33 of the original 100 patients reviewed, had MMPI profiles with T-scores on the hypochondriasis and hysteria scales between 71 and 89. This was the only group of patients who presented what has been referred to as the low back profile by such researchers as Sternbach (1973). (See Figure 3) The profile was interpreted as a hysterical conversion profile of a milder nature than the profile of Group II. This group of patients might be described as the typical low back pain patients and would be expected to do well in the program (Sternbach, 1973; Wiltse & Rocchio, 1973; Beals & Hickman, 1972). This group of patients was not used in this study because the researcher felt it was important to have a side separation in T-scores of the members of the two groups studied to avoid any possible overlap of scores and consequent confounding of the data. It also eliminated the problem of members of the two groups having only slightly different personality traits as measured by the MMPI scales of hypochondriasis and hysteria.

Results of an analysis of variance, using a two-factor design with repeated measures showed no significant differences between the two groups in regard to improvement on the exercise. There was, however, a significant difference in performance of patients for both

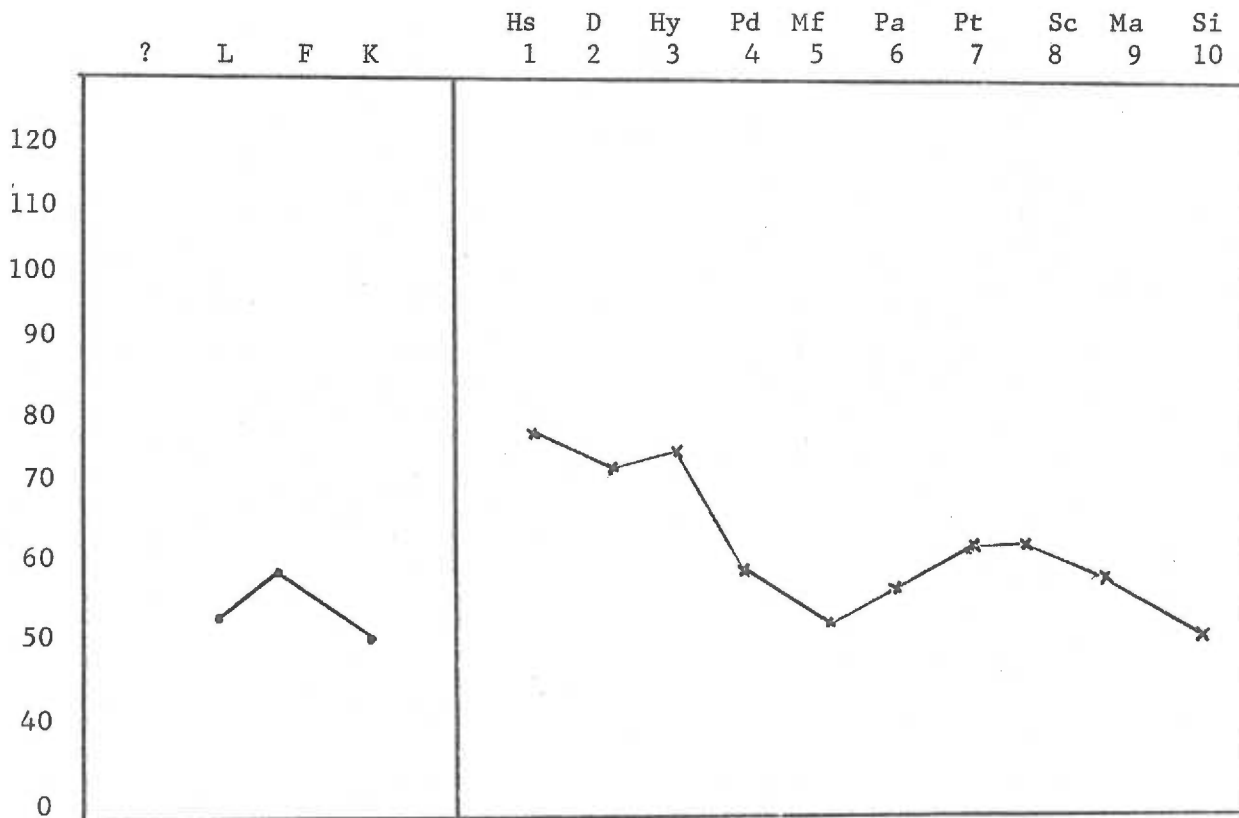


Figure 3. Composite MMPI profile of patients in the group not studied with T-scores between 71 and 89 on the hypochondriasis and hysteria scales.

groups from the time of admission to the time of followup re-evaluation in their performance of the exercise.

Figure 4 illustrated the trend of patient performance on the "long-sitting to toe" exercise. The trend is toward improvement, that is, a decrease in the number of inches from fingertips to toes. As can be seen in the graph, the greatest improvement is from admission to discharge. The level of performance achieved by the time of discharge was essentially maintained until followup. Members of Group I, the more "normal" group, showed slight continued improvement from discharge to followup, while members of Group II showed slight decrease in performance. Neither of the above changes in improvement were statistically significant.

The literature suggests that, based on specific T-scores on the hypochondriasis and hysteria scales of the MMPI, the MMPI can be used to discriminate between patients with complaints of low back pain who are most likely to have successful results from surgery. This study was designed to test the MMPI as a tool for predicting the success of chronic low back pain patients in a non-surgical, multidisciplinary treatment center.

Table 2 presents the means and standard deviations for each group at each evaluation period. There are minimal differences in the scores of each group when compared at each evaluation period. Data in Table 2 illustrate that there was less than a one-inch difference in the mean exercise scores of each group at each evaluation period except the last one. At the final evaluation there was a difference

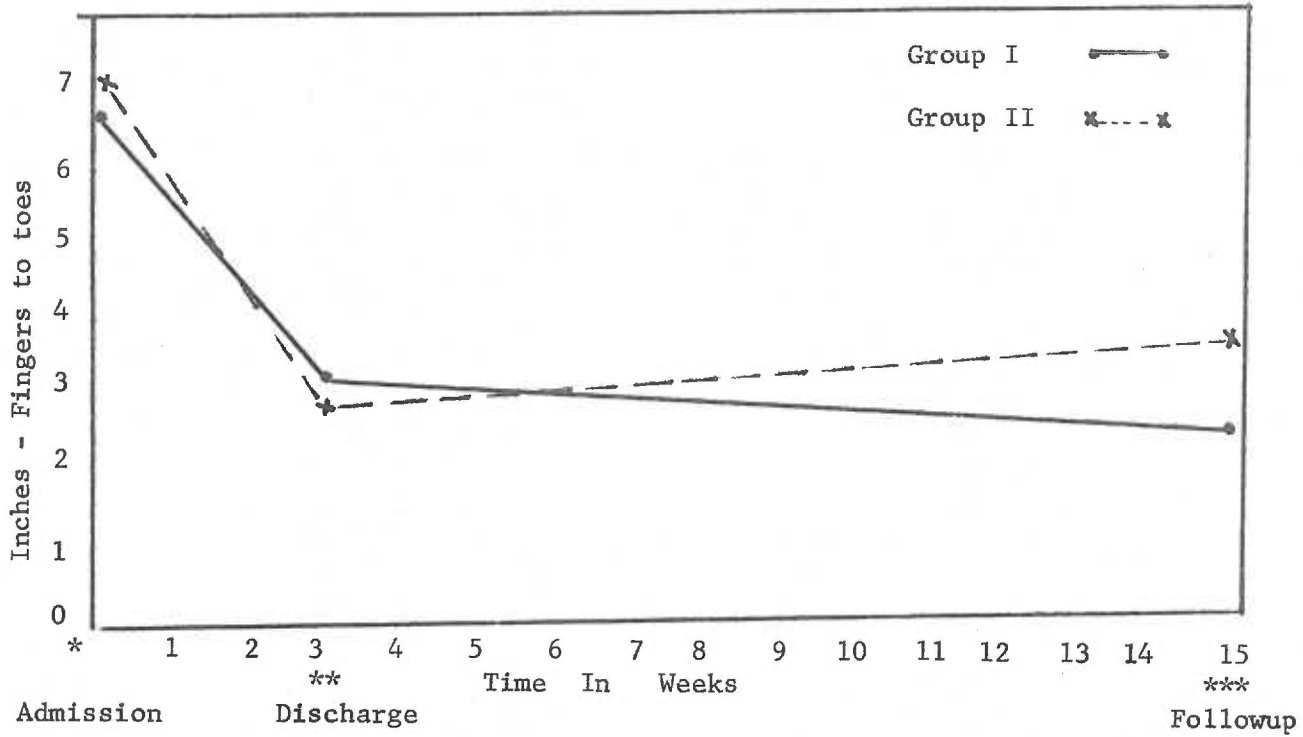


Figure 4. Mean number of inches for the groups in their level of performance of the "long-sitting to toe" exercise at admission, at discharge, and on followup evaluation.

(* admission, **discharge, *** followup evaluation)

Table 2. Means and standard deviations of each groups on the performance of the exercise "long-sitting to toes." Mean is the number of inches from fingertips to toes.

		Before Treatment	At Discharge	At 3-month Follow-up
Group I	n:	15	15	15
	\bar{X} :	7.0	3.2	2.2
	sd:	26.19	11.97	8.23
Group II	n:	15	15	15
	\bar{X} :	7.26	3.06	3.26
	sd:	27.18	11.47	12.22

of 1.06 inches in the mean performance on the exercise test and a difference of 4 points in the standard deviation. An analysis of variance did not demonstrate statistically significant difference, however. Followup evaluations at 6 months and one year would be valuable to ascertain if the trend presented by each group persists. It might be that in time a significant difference would develop between the two groups.

An analysis of variance of the data (Table 3) demonstrated no statistically significant differences between the groups in the amount of improvement each made at the different evaluation periods. This finding does not support the hypothesis that the MMPI has predictive validity for the treatment of low back pain patients in a multidisciplinary treatment center. More specifically, the findings did not support that chronic low back pain patients with a T-score of 70 or below on the hypochondriasis and hysteria scales of the MMPI would decrease the number of inches from fingertips to toes in the "long-sitting to toes" exercise as a result of the treatment in the multidisciplinary treatment center and chronic low back pain patients with a T score of 90 or above would not decrease the number of inches from fingertips to toes in the exercise. Statistical analysis of data showed both groups had changed their level of performance from the time of admission to the PPRC to the time of the three months followup evaluation. According to these data, use of the MMPI as a predictive tool at a multidisciplinary treatment center is of questionable value, especially for those low back pain patients treated at the PPRC. Such results suggest that the

Table 3. Analysis of variance table on the change in the level of performance on the "long-sitting to toe" exercise.

SOURCE	At	SS	MS	F
Between Groups	29	1391.66		
Groups (A)	1	3.6	3.6	
Subjects within groups	28	1388.06	49.5735	0.07261
Within Groups	60	1142.34		
Evaluation periods (B)	2	355.2	177.6	
A x B	2	5.6	2.8	0.20063
Bx subjects within groups	56	781.54	13.956	* 12.7257

*

$p > (.01)$

center meets and deals with the needs of individuals who suffer from chronic low back pain. The PPRC takes the patient where he is on admission and after a thorough evaluation by the staff members, an intensive individualized program is planned for him using the modalities described earlier. Staff members are consistent in their approach to the patient and stay abreast of the patients' progress in all parts of the program in order to maintain continuity in their approach to the patient. The program is flexible, in that, if a plan or approach fails with a particular patient, revisions are made by the staff as a team. Patients are taught how to apply what they learn about pain control in the PPRC to the life they lead outside of the center. Numerous clinicians have urged this kind of treatment for patients with chronic pain (Sternbach, 1973; Beals & Hickman, 1972, Bonica, 1974; Bonica et al., 1974; Clawson et al., 1972; Fordyce, 1974, Melzack, 1973).

While the group size in this study was small, the groups represented both extremes of patients treated in the PPRC in terms of personality profiles on the MMPI. They were representative of the total patient population in terms of age, number of surgeries prior to treatment, and duration of their chronic pain problem.

An analysis of variance (Table 3) indicated that improvement of both groups of patients in the performance of the exercise "long-sitting to toe" was significant at an alpha level of 0.01. As previously discussed as well as illustrated in Figure 4, the greatest improvement was from admission to discharge. This would be expected since the patients

are in a somewhat sheltered environment receiving ongoing feedback and encouragement during this time. This improvement was maintained following discharge for a three-month period of time, during which the patients were not in contact with the PPRC.

Increase in activity, such as is evidenced by improvement in the exercise, has been described in the review of the literature as nonpain behavior. An increase in nonpain behavior or a decrease in pain behavior is one of the treatment goals of a center such as the PPRC (Seres & Newman, 1974; Fordyce, 1974; Clawson et al., 1972; Bonica, 1974; Bonica & Fordyce, 1974). The results of this study suggest that the PPRC is effective in increasing nonpain behavior, at least on a short term basis. Such results lend support to the literature which suggests that patients suffering from chronic pain be treated in a multidisciplinary treatment center set up for the treatment of chronic pain (Fordyce, 1974; Melzack, 1973; Bonica, 1974; Bonica & Fordyce, 1974; Clawson et al., 1972). Further data is needed on followup at longer periods of time, such as 6 months, one year, and two years, to further substantiate the findings of this study.

Chapter 4

Summary, Conclusions, and Recommendations

The MMPI was evaluated as a tool for predicting success of low back pain patients in a multidisciplinary treatment center. Two groups of 15 patients each were studied. Members of one group, with T-scores on the MMPI hypochondriasis and hysteria scales of 70 or below, represented "normal" patients. Members of the other group, with T-scores of 90 or above, represented "abnormal" patients. Subjects in the two groups were evaluated on a physical exercise, that of "long-sitting to toe" of the Williams' Flexion Exercises. They were evaluated on admission, at discharge, and again three months after discharge from the center. An analysis of variance of the data revealed no significant differences between the groups on improvement. There was a significant difference within groups on improvement from admission to discharge. This level of improvement was maintained until the followup evaluation. Conclusions from the study include:

1. The MMPI does not appear to be useful for predicting success of treatment of chronic low back pain patients in a multidisciplinary treatment center on a short term basis.
2. A multidisciplinary center for the treatment of chronic pain can be effective in increasing nonpain behavior for at least three months.
3. Further research is needed in the area of pain rehabilitation, especially with long-term followup.

Recommendations include:

1. Followup evaluations on these subjects again at six months and one year to ascertain if the trend presented by each group persists.
2. Further data on a larger number of subjects to further substantiate the findings of this study.
3. Further research in the area of treatment and rehabilitation of patients with chronic low back pain, especially with long-term followup.
4. Continued emphasis on a multidisciplinary approach to the treatment of chronic low back pain.

References

- Abram, H.S. The psychology of chronic illness. Journal of Chronic Diseases, 1972, 25, 659-664.
- Aiken, A.P. Rupture of the intervertebral disc in industry. American Journal of Surgery, 1952, 84, 261.
- Antonovsky, A., & Kats, R. The life crisis history as a tool in epidemiological research. Journal of Health and Social Behavior, 1967, 8, 15-21.
- Beals, R.K., & Hickman, N. W. Industrial injuries of the back and extremities. The Journal of Bone and Joint Surgery, 1972, 54A, 1593-1611.
- Benedetti, G. Psychologic and psychiatric aspects of pain. In J.J. Bonica, P. Procacci, & C.A. Pagni (Eds.), Recent advances in pain. Springfield, Illinois: Charles C. Thomas, 1974.
- Blackwell, B.L. Upper middle class adult expectations about entering the sick role for physical and psychiatric dysfunction. Journal of Health and Social Behavior, 1967, 8, 83-95.
- Bonica, J.J. General clinical considerations (including organization and function of a pain clinic). In J. J. Bonica, P. Procacci, & C.A. Pagni (Eds.), Recent advances in pain, Springfield, Illinois: Charles C. Thomas, 1974.
- Bonica, J.J. Organization and function of a pain clinic. In J.J. Bonica (Ed.), Advances in neurology: international symposium on pain. (Vol. 4) New York: Raven Press, 1974.
- Bonica, J.J. Advances in neurology: international symposium on pain. (Vol. 4) New York: Raven Press, 1974.
- Bonica, J.J., & Fordyce, W.E. Operant conditioning for chronic pain. In J.J. Bonica, P. Procacci, & C.A. Pagni (Eds.), Recent advances in pain. Springfield, Illinois: Charles C. Thomas, 1974.
- Bonica, J.J., Procacci, P., & Pagni, C.A. (Eds.), Recent advances in pain. Springfield, Illinois: Charles C. Thomas, 1974.
- Campbell, D.T., & Stanley, J.C. Experimental and quasi-experimental designs for research. Chicago: Rand McNally & Co., 1963.

- Carson, R. C. An introduction to MMPI interpretation. Duke University, 1960.
- Clawson, D.K., Bonica, J.J., & Fordyce, W.E. Management of chronic orthopaedic pain problems. In The American academy of orthopaedic surgeons instructional course lectures. St.Louis: C.V. Mosby Co., 1972.
- Downie, N.M., & Heath, R.W. Basic statistical methods (2nd ed.). New York: Harper & Row, 1965.
- Edwards, A.L. Statistical methods (2nd. ed.). New York: Holt, Rinehart and Winston, Inc., 1967.
- Engel, G.L. "Psychogenic" pain and the pain-prone patient. American Journal of Medicine, 1959, 26, 899-918.
- Finneson, B.E. Low back pain. Philadelphia: J.B. Lippincott Co., 1973.
- Fordyce, W. E. The office management of chronic pain: learning factors. Minnesota Medicine, 1974, 57 (3), 185-188.
- Fordyce, W.E. Treating chronic pain by contingency management. In J.J. Bonica (Ed.), Advances in neurology: international symposium on pain. (Vol. 4) New York: Raven Press, 1974.
- Fordyce, W.E. Pain as a learned behavior. In J.J. Bonica (Ed.), Advances in neurology: international symposium on pain. (Vol. 4) New York: Raven Press, 1974.
- Fordyce, W., Fowler, R., & DeLateur, R. An application of behavior modification technique to a problem of chronic pain. Behavior Research and Therapy. 1968, 6, 105-107.
- Fordyce, W.E., Fowler, R.S. & Lehmann, J.F., & DeLateur, B.J. Some implications of learning in problems of chronic pain. Journal of Chronic Diseases, 1968, 21, 179-190.
- Fox, J.L. Dorsal column stimulation for relief of intractable pain: Problems encountered with neuropacemakers. Surgical Neurology, 1974, 2, 59-64.
- Gilberstadt, H., & Duker, J. A handbook for clinical and acturial MMPI interpretation. Philadelphia: W.B. Saunders Co., 1965.
- Halliday, W.R. Innovative approaches to the industrial low back problem patient. Paper presented at the 84th Annual Convention of the Washington State Medical Association, September 24, 1973.

- Hanvik, L.J. MMPI profiles in patients with low back pain. In G.S. Welsh & W.G. Dahlstrom (Eds.), Basic readings on the MMPI in psychology and medicine. Minneapolis: University of Minnesota Press, 1956.
- Hathaway, S.R., & McKinley, J.C. Minnesota multiphasic personality inventory manual. New York: The Psychological Corporation, 1951.
- Jacobs, S. Backache: A multidisciplinary approach to its treatment. Psychiatry in Medicine, 1973, 4 (2), 221-230.
- Kasl, S.V., & Cobb, S. Health behavior, illness behavior, and sick-role behavior. 1. Health and illness behavior. Archives of Environmental Health, 1966, 12, 531-541
- Kiely, W.T. Coping with severe illness. Advances in Psychosomatic Medicine, 1972, 8, 105-118.
- Kirkpatrick, R.A. Learning theory in the treatment of chronic disease. Northwest Medicine, 1972, 12, 899-902.
- Levit, H.I. Depression, back pain, and hypnosis. American Journal of Clinical Hypnosis, 1973, 15, 266-269.
- Ludwig, E.G., & Adams, S.D. Patient cooperation in a rehabilitation center: Assumptions of the client role. Journal of Health and Social Behavior, 1968, 9, 328-336.
- Mechanic, D. The concept of illness behavior. Journal of Chronic Diseases, 1962, 15, 189-194.
- Melzack, R. The puzzle of pain. New York: Basic Books, Inc., 1973.
- Melzack, R., & Wall, P.D. Gate control theory in pain. In A. Soulaïrac (Ed.), Pain, proceedings of the international symposium on pain, Paris, 1967. London: Academic Press, 1968.
- Merskey, H., & Spear, F.G. Pain: psychological and psychiatric aspects. London: Baillere, Tindell, and Cassell, 1967.
- Murray, J.B. Psychology of the pain experience. Journal of Psychology, 1971, 78, 193-206.
- Nagi, S. Z., Burk, R.D., & Potter, H.R. Back disorders and rehabilitation achievement. Journal of Chronic Diseases, 1965, 18, 181-197
- Newman, R.I. Personal Communication, June, 1975.

- Phillips, E.L. Some psychological characteristics associated with orthopaedic complaints. In J.P. Adams (Ed.), Current Practice in Orthopaedic Surgery, St. Louis: The C.V. Mosby Co., 1965.
- Rosenbaum, A.H., & Steinmilber, R.M. Psychosomatic disorders. Combined therapeutic approach. Minnesota Medicine, 1973, 56, 677-679.
- Seres, J.L., & Newman, R.I. An outcome study of effectiveness of the Portland pain rehabilitation center for the treatment of intractable pain. Unpublished manuscript, 1974. (Available from 3001 N. Gantenbein, Portland, Oregon).
- Stauffer, R.N., & Coventry, M.B. Posterolateral lumbar spinal fusion. Journal of Bone and Joint Surgery, 1972, 54A, 1195-1204.
- Sternbach, R.A. Pain: A psychophysiological analysis. New York: Academic Press, 1968.
- Sternbach, R.A. Varieties of pain games. In J.J. Bonica (Ed.), Advances in neurology: international symposium on pain. (Vol. 4) New York: Raven Press, 1974.
- Sternbach, R.A., & Tursky, B. Ethnic differences among housewives in psychophysical and skin potential responses to electric shock. Psychophysiology, 1965, 1, 243.
- Sternbach, R.A., Wolf, S.R., Murphy, R.W., & Akeson, W.H. Traits of pain patients: the low back "loser." Paper presented at the 19th Annual Meeting of the Academy of Psychosomatic Medicine, San Diego, 1972.
- Sternbach, R.A., Wolf, S.R., Murphy, R.W., & Akeson, W.H. Aspects of chronic low back pain. Psychosomatics, 1973, 14, 52-56.
- Sternbach, R.A., Murphy, R.W., Akeson, W.H., & Wolf, S.R. Chronic low-back pain: the "low-back loser," Post-Graduate Medicine, 1973, 53 (6), 135-138.
- Szasz, T.S. The psychology of persistent pain: a portrait of l'homme douloureux. In A. Soulaireac (Ed.), Pain, proceedings of the international symposium on pain, Paris, 1967. London: Academic Press, 1968.
- Szasz, T.S. Ideology and insanity. New York: Doubleday and Co., 1970.

- Twaddle, A.C. Health decisions and sick role variations. An explanation. Journal of Health and Social Behavior, 1969, 10, 105-115.
- Wilfling, F.J., Klonoff, H., & Kokan, P. Psychological, demographic, and orthopaedic factors associated with prediction outcome of spinal fusion. Clinical Orthopaedics and Related Research, 1973, 90, 153-160
- Wiltse, L.L., & Rocchio, P.D. Predicting success of low-back surgery by use of pre-operative psychological tests. Paper presented at the Annual Meeting of the American Orthopaedic Association, Hot Springs, Virginia, 1973.
- Yochelson, L. Psychiatric aspects of backache. In J. J. Adams (Ed.), Current practice in orthopaedic surgery. St. Louis: C.V. Mosby Co., 1966.
- Zborowski, M. People in pain. San Francisco: Jossey-Bass, Inc., 1969.

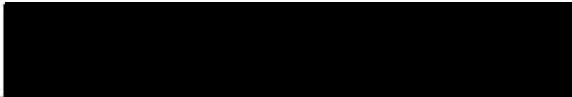
AN ABSTRACT OF THE FIELD STUDY OF

NANCY A. SERES

For the: MASTER OF NURSING

Date of receiving this degree: June 11, 1976

Title: THE MMPI AS A PREDICTIVE INSTRUMENT FOR SUCCESS OF
TREATMENT OF PATIENTS WITH LOW BACK PAIN IN A
MULTIDISCIPLINARY TREATMENT CENTER

Approved: 
Marie Berger, M. S., Field Study Advisor

The purpose of this study was to evaluate the usefulness of the MMPI for predicting the success of chronic low back pain patients in a multidisciplinary treatment center. Two groups of 15 patients each were studied. Members of one group, with T-scores on the MMPI hypochondriasis and hysteria scales of 70 or below, represented "normal" patients. Members of the other group, with T-scores of 90 or above, represented "abnormal" patients. Subjects in the two groups were evaluated on a physical exercise, on admission, at discharge, and again three months after discharge from the center.

Conclusions

The results of the study revealed no significant differences between groups on improvement in the performance of the exercise. The conclusion drawn was that the MMPI does not appear to be useful for predicting success of treatment of chronic low back pain patients in a multidisciplinary treatment center on a short term basis. There was, however, a significant difference within groups on improvement from admission to discharge, a level of improvement that was maintained until followup, suggesting that a multidisciplinary center for the treatment of chronic pain can be effective in increasing nonpain behavior for at least three months.