The relationship between pain locus of control and treatment adherence at long-term follow-up from an interdisciplinary pain center

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THE RELATIONSHIP BETWEEN PAIN LOCUS OF CONTROL AND TREATMENT ADHERENCE AT LONG-TERM FOLLOW-UP FROM AN INTERDISCIPLINARY PAIN CENTER

Presented to the
Department of Psychology
and the
Faculty of the Graduate College
University of Nebraska

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts in Psychology
University of Nebraska at Omaha

by
Lisa J. Wall
May, 1992
THESIS ACCEPTANCE

Acceptance for the faculty of the Graduate College, University of Nebraska, in partial fulfillment of the requirements for the degree, Master of Arts, University of Nebraska at Omaha.

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Abstract

Locus of control is a cognitive construct that can be quantified and used in conjunction with other social learning theory variables to predict human social behavior. Previous research suggests that when a person perceives rewards and punishments as being contingent upon personal actions, (i.e. they possess an internal locus of control) behavior is quite different compared to when such reinforcements are perceived to occur independently of personal efforts and characteristics.

Pain is one of many areas in which there has been a significant amount of interest in relating locus of control health beliefs to a variety of relevant behaviors. Whether knowledge of pain locus of control will further understanding of how often people use learned intervention strategies to manage their pain in order to maintain therapeutic intervention standards to which they have been exposed at a specific pain management facility was the focus of the present study.

Instruments used in this study were the Pain Locus of Control Scale (PLOC), the Visual Analogue Scale (VAS), an Interference Scale (INTF), and a Scale of Value and Usefulness (SOVU) developed by the principal
investigator. It was hypothesized that there would be a significant correlation between those classified as High Internals on the PLOC and the activities posited in the SOVU. However, such correlations were not supported by the research. It was also hypothesized that those who scored as High Internals would show greater decrease in level of pain (as measured by the VAS) and level of pain interference (as measured by the INTF) between pre- and post-tests. These decreases did occur in this sample. An exploratory regression analysis revealed that a Powerful Others orientation and age were the best predictors of the VAS and that a Powerful Others orientation was the best predictor of the INTF. Limitations were discussed and further research directions were posited.
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Chapter I--The Problem

A link between pain and the emotions was recognized by the ancient Hebrews and the Greeks. In the book of Lamentations, Jeremiah, mourning the destruction of Jerusalem, indicated that pain felt in the body was due to emotional distress. Pain, an experience which was first associated with damage to the body, was used as a symbol of suffering in general. For Aristotle, pain was one of the "passions of the soul" by which he meant it was a sensation as well as an emotional state.

If one looks a little longer at Jeremiah's words another aspect is evident. The man who is in such an extreme state of pain because of the sack of Jerusalem had an experience like "fire in the bones" and felt weary and faint all day. Take away the poetry, speak of burning pains and chronic fatigue, and a picture emerges of many patients who have pain for psychological reasons but whose pain is associated with bodily symptoms. Pain can mean an experience which is located in the soma (body).

The early psychological literature was usually vague in specifying whether patient's descriptions of mental processes applied to organic or psychogenic
pain, and to acute or chronic states. The early psychological literature was concerned with thresholds and the question of whether pain was a sensation or a feeling state, and had little clinical relevance (Sternbach, 1978).

Clinicians, however, can seldom deal with highly structured situations. They may be asked to consider the effects of many situations upon a patient's behavior, not just one. Clinicians often do not have the luxury of knowing specifically in what situation(s) their patients will find themselves five years from now. The lack of information regarding the nature of specific situations may force clinicians to rely more heavily than they would like on general psychological constructs.

There are many good reasons for conceptualizing behavior, at least in part, in terms of these various constructs and having appropriate scales for their measurement. Clinicians must deal with behavior of patients in circumstances which are unknown to the clinician. That is, they must predict what patients are likely to do without knowing completely the exact
nature of each situation in which patients find themselves.

Locus of control is a psychological cognitive construct that can be quantified and used in conjunction with other social learning theory variables to predict human social behavior. The role of locus of control in personal adjustment continues to hold great promise for increasing our understanding of human behavior. Accumulated research (e.g. Lefcourt, 1976; Levenson, 1972, 1973c, 1975; Rotter, 1966, 1975) indicates that belief in personal control, powerful others, and chance can have widespread, important, and desirable outcomes on behavior.

People with an external locus of control make reduced attempts to seek information (Pines, 1973). They pay less attention to cues in the environment to help them cope more effectively (Biondo & MacDonald, 1971; Reisman, 1954; Tolor, 1971). They have a prevailing belief that outcomes are the result of factors other than their own behavior (Phares, Ritchie, & Davis, 1968). Externals believe that their behavior is not the effective agent in achieving rewards (Phares, 1962). They have less concern with personal
achievement (Brown & Strickland, 1972; Julian, Lichtman, & Ryckman, 1968) and less delay of gratification (Strickland, 1972).

People with an internal locus of control engage in exhaustive efforts to seek information (Davis & Phares, 1967; Seeman & Evans, 1962). Internals are more prone to recognize environmental cues and use them in order to cope more effectively (Pines & Julian, 1972). They believe that occurrences of reinforcements come about because of their own behavior. Internals believe they are more responsible for the outcomes of events and that these outcomes are a direct result of their own behavior (Hersch & Scheibe, 1967; Phares, 1965; Phares et al., 1968; Straits & Sechrest, 1963; Tseng, 1970). Internals are highly concerned with personal achievement (Lefcourt, 1972; Mischel, Zeiss, & Zeiss, 1974) and are willing to delay gratification for extended periods of time (Bialer, 1961; Strickland, 1973; Walls & Smith, 1970; Zytkoskee, Strickland, & Watson, 1971).

Research identifies internals as superior in their efforts at coping with and gaining a measure of control over their environment (Seeman & Evans, 1962). As
compared to externals, internals acquire more information, retain and utilize it better, and are generally more effective in the area of cognitive processing (Davis & Phares, 1967; Seeman, 1963; Seeman & Evans, 1962; Williams & Stack, 1972). Locus of control refers to expectancies for control over one's surroundings; therefore, a higher level of coping and activity would be anticipated from internals. Since obtaining positive outcomes and avoiding negative ones indicates more active controlling efforts, internals would probably have more effective coping strategies and enhanced mastery behavior.

There is accumulating evidence that internals place higher value on outcomes (e.g. Rotter & Mulry, 1965) and are more highly motivated to perform well in situations that allow them to exercise skill, control, or self-reliance (Julian & Katz, 1968; Ryckman & Rodda, 1971; Ryckman, Rodda, & Stone, 1971; Ryckman, Stone, & Elam, 1971). By combining the cognitive and motivational aspects of locus of control, one can assert that internals will be in a superior position to exert control and power over their environment.
Only through construction of measures of the locus of control can one study the effect of various locus of control beliefs upon behavior. The preceding research studies suggest that when a person perceives rewards and punishments as being contingent upon personal actions, behavior is quite different compared to when such reinforcements are perceived to occur independently of one's own efforts and characteristics.

Belief in predominantly external or internal control over consequences of one's own behavior is a concept that has wide application. The development of the I-E (Internal-External) Scale by Rotter and other measures such as the Multidimensional Health Locus of Control (MHLC) Scales by Wallston, Wallston, and DeVellis (1978) and the Pain Locus of Control (PLOC) Scale by Toomey, Lundeen, Mann, and Abashian (1988) has allowed definition of internal/external control dimensions along which people can be ordered.

While locus of control is an important determinant of behavior, its effects are moderated by reinforcement value, expectancies, and the psychological situation. Belief in specific control (or lack of it) is a general disposition that influences an individual's behavior.
across a wide range of situations and a rather specific belief that may apply to a limited number of situations. For example, while people may generally subscribe to the notion that they have only restricted control over their lives, they nevertheless may feel that in some specific situations, they can exert much control (Lundy, 1972; MacDonald, 1970; Phares & Wilson, 1972a; Straits & Sechrest, 1963).

By studying a specific situation that differs in the extent to which it arouses specific expectancies about the internal and external locus of control, research has revealed several things. Learning and performance are influenced (Phares, 1962) and expectancies for future success or failure are differentially evoked (Lazarus, 1966). Most research in this area is supportive of the contention that locus of control as a specific situational expectancy is helping to account for variations in behavior shown in highly structured situations.

Research in health-related behavior has increased dramatically in recent years. Major discoveries about the nature of health and illness have made both the prevention and the management of chronic diseases far
more important today than they were a generation ago when the focus of health care was on infectious diseases and acute care. There have been major breakthroughs against many infectious diseases, but people are living longer and are more likely to have chronic conditions.

Psychological approaches to health research are concerned with people’s responses to health and illness. The Health Locus of Control (HLC) Scale (Wallston, Wallston, Kaplan, & Maides, 1976) and the Multidimensional Health Locus of Control (MHLC) Scale (Wallston et al., 1978) have been used to investigate many different kinds of health-related behaviors including information seeking, preventive health behavior, smoking reduction, weight reduction, dental behavior (see Wallston & Wallston, 1981) and adherence to medical regimens (see Turk & Rudy, 1991). A number of these studies that are currently in progress or in the planning stages are using the MHLC scales with patient populations. Some of the best and most creative research with the locus of control construct has been done using health-specific measures.
Pain is one of many areas in which there has been a significant amount of interest in relating locus of control health beliefs to a variety of relevant behaviors. Toomey, Lundeen, Mann, and Abashian (1988) revised the MHLC in order to develop the Pain Locus of Control (PLOC) Scale. Whether knowledge of pain locus of control will further understanding of how often people use learned intervention strategies to manage their pain in order to maintain therapeutic intervention standards to which they have been exposed at a specific pain management facility is the focus of this study.

Pain can be broken into two categories, acute and chronic. There is a significant difference between them. Acute pain, meaning pain of recent onset and of short duration, presents a different set of circumstances than chronic pain which is constant and at least several months in duration. When pain and the associated symptom complex persist for long intervals, there is inherently present an increased opportunity for learning and conditioning effects to exert influence. One set of symptoms associated with pain is behaviors.
The chronic pain experience is beginning to be conceptualized and dealt with as a multidimensional psychosocial experience. This new reconceptualization has led to the emergence of interdisciplinary pain centers (Bonica, 1953; Fordyce, Fowler, & DeLateur, 1968). The chief concern of pain clinic programs is aiding the patient in learning how to live successfully with his/her pain. Maladaptive pain-related behaviors are identified and eliminated. Healthy behaviors, such as exercise, are reinforced. All pain-related medications are systematically terminated. Psychosocial issues are discussed with the patient and his/her family (Sternbach, 1978).

In this study, an assessment of the use of this type of training received by individuals to manage their pain through such therapeutic intervention strategies as exercising, relaxation tape listening, and assertiveness skills training will be undertaken. An evaluation of the individual's perception of the importance of these strategies will also be done.

Although post-treatment only and pre-treatment to post-treatment follow-up studies have not and can not provide conclusive evidence for the efficacy of the
pain center approach, they have made two important contributions. They have demonstrated that significant changes do take place in the lives of individuals treated in pain centers. They have also used outcome criteria consistent with the goals of the pain management center approach, that is, to return individuals to a normal lifestyle.

The term adherence is used to imply a more active, voluntary collaborative involvement of the patient in a mutually acceptable course of behavior to produce a desired result (Meichenbaum & Turk, 1987). Adherence conveys the idea of choice and mutuality in treatment planning and implementation. The effectiveness of any treatment depends upon the appropriateness of the treatment and the extent to which patients ADHERE to the recommended regimen. For the purposes of this paper, therefore, adherence will be substituted for the word compliance. Patients who are adherent are viewed as acting on a consensually agreed-upon plan that they may have had a part in designing.

Despite acknowledging the importance of adherence in evaluating treatment maintenance, most treatment studies make no effort to assess the adherence rates of
the patients treated. For example, Souter and Kennedy (1974) reviewed 768 studies, published in the British Medical Journal and the Lancet between January 1969 and December 1972, of drug effects. Of the studies surveyed, 324 (42%) required an assessment of adherence to insure that the drugs were taken according to the prescribed medical protocol. Of those studies, only 61 (19%) employed an objective measure of adherence. The authors concluded that many published trials should include an objective assessment of adherence to obtain more valid results.

Recently, in a comprehensive and detailed review of the literature evaluating the efficacy of antidepressant medication for chronic pain, Goodkin and Guillon (1989) concluded that rarely was patient adherence with the treatment protocol considered, let alone verified. In light of the subsequent research to be presented on locus of control, pain, treatment outcome, efficacy of the pain center approach, and adherence, it seems to be appropriate to undertake an investigation of the relation of these variables to one another through objective means.
Statement of the Problem

The cited research will support the internal orientation as being related to more favorable outcomes following pain treatment, whereas the external orientation is related to less favorable outcomes (Hudzinski & Levenson, 1985). Locus of control, as well as treatment adherence, are complex issues. Age, sex, and level of pain are only a small part of a host of factors that bear on cognitive functioning and treatment outcome (Turk & Rudy, 1991).

The great volume of published research on the locus of control should give one increased confidence that the concept can be applied to the maintenance of the alleviation of pain. This present study will produce knowledge of the locus of control concept as it is applied to the evaluation of maintenance of therapeutic intervention strategies. The focus will be on the individual aspects of the person, in particular, if an internal pain locus of control orientation influences adherence to a personal pain management program.

Specifically, the Pain Locus of Control (PLOC) Scale will be used in this study (Toomey, Lundeen,
Mann, & Abashian, 1988). The PLOC is a psychometric instrument developed to assess expectations that pain is determined by internal control, control by powerful others (physicians and/or family members) or chance. This three-factor scale has been used in a variety of research and clinical settings in the health care field (e.g. Penzien et al., 1989; Toomey, Lundeen, Mann, & Abashian, 1988). Age, sex, level of pain (assessed with a visual analogue scale (VAS)) and level of pain interference in daily activities will be assessed at pre- and post-treatment. To assess adherence, a questionnaire which posits various intervention strategies used by the patient/subject and the number of times of their actual and desired use, and an importance rating of these strategies by the patient/subject will be developed by the principal investigator of this study.

Theoretical Orientation

Social learning theory is a theory of how choices are made by individuals from the variety of potential behaviors available to them (Rotter, Chance, & Phares, 1972). In order to understand social learning theory, some terms must be defined. A reinforcement is
anything that has an effect on the occurrence, direction, or kind of behavior. The value of a reinforcement is the degree of preference for any reinforcement to occur if the possibilities of its occurrence were all equal. This applies when focusing the discussion on environmental factors (Rotter, 1954).

An expectancy is the possibility held by the individual that a particular reinforcement will occur as a function of a specific behavior on his/her part in specific situation(s) (Rotter, 1954). The psychological situation is defined as any given situation that will elicit specific and/or general effects on behavior (Rotter, 1955).

Behavior may be said to be goal-directed in the sense that people strive to attain or to avoid certain aspects of their environment. Behavior is motivated and determined by the degree to which people expect that their behavior will lead to goals, as well as by reinforcement through goal achievement (Rotter et al., 1972).

In the realm of social behavior, useful concepts in social learning theory consist of learned attitudes, values, and expectations. Successful past experiences
with a given behavior will lead to the expectation that it will work in the future. Failure will decrease the individual's expectancy that the behavior will achieve a given goal. Expectancies for the outcomes of behavior are, therefore, learned. Changes in expectancies can be brought about by introducing new expectancies that alter previous patterns of success and failure (Rotter, 1954; Rotter et al., 1972).

According to social learning theory, the value of the reinforcements toward which the behavior is directed and the expectancy that the behavior will lead to those reinforcements must be determined. To determine which behaviors have the strongest potential for occurrence, one must consider expectancy, reinforcement value, and the psychological situation. Behavior potential is higher when expectancy and reinforcement value are both high (Davis & Phares, 1967). Requiring that expectancies, reinforcement values, and the situation be considered in making predictions about behavior appears preferable to relying on a single variable such as a trait or habit.
Chapter II—Review of the Literature

Internal versus External Locus of Control

Locus of control operates both as a belief directed toward one specific situation and as a generalized expectancy covering many diverse ones. If the cues of a specific situation are strong enough, the behavior of most individuals will be similar, regardless of their generalized beliefs. On the other hand, when a situation is ambiguous, the behavior of most individuals is much more likely to reflect their generalized locus of control beliefs (Rotter, 1954; Rotter et al., 1972).

The effects of reinforcement on behavior vary depending upon the way in which people perceive the locus of control of that reinforcement. Learning and performance in specific situations are different when subjects perceive that they control the contingency between behavior and reinforcement and when they perceive that they lack such control (Phares, 1962). When people feel that they control the situation, they are more likely to exhibit perceptual behavior that will enable them to cope with potentially threatening situations (e.g. electrical shock) than are those who
feel that chance or other uncontrollable forces determine whether their behavior will be successful.

In short, there appears to be a direct relationship between the extent of coping behavior and the expectancy that one’s skill or ability is the crucial variable in achieving reinforcement. A behavior is likely to reoccur if it is reinforced in people who believe that there is a contingency between their behavior and reinforcement (Phares, 1976).

The work of Geer, Davison, and Gatchel (1970) indicates that perception of effective control, even when not correct, can reduce autonomic responding. Staub, Tursky, and Schwartz (1971) demonstrated that no-control subjects judged a less intense electrical shock as uncomfortable and tolerated fewer shocks as compared to self-control subjects. These authors suggested that personal control and predictability can reduce the aversiveness of noxious stimulation.

This seems to be in general support of Lazarus’ (1966) contention that an individual’s perception of threat in potentially anxiety-arousing situations is mediated by a belief about his/her ability to exert control (an internal locus of control orientation) over
that potential threat. Feelings of stress in an aversive situation are proportional to expectations about personal control over situational events.

**Information Seeking.** If one shifts attention to specific aspects of those with an internal locus of control, Seeman and Evans (1962), in one of the earliest studies in the literature, focused on the relationship between locus of control, knowledge, and information-seeking behavior of patients in a tuberculosis hospital. They used an early 12-item version of Rotter's (1966) I-E Scale to select 43 internal-external pairs of white male patients. Each pair was matched for occupational status, education, and ward placement.

They found that internals knew more about their condition, were more inquisitive with physicians and nurses about tuberculosis and their own situation, and indicated less satisfaction with the amount of information they were getting from hospital personnel. Internals attempted to gain a greater degree of control over their life situation than did externals.

A Seeman and Evans study (1962) suggests that a low generalized expectancy for personal control also
contributes to reduced acquisition of information. They further suggest that this is so because belief in an external locus of control is accompanied by a low expectancy that one's own efforts will have little impact; therefore, information acquisition is not seen as a productive enterprise.

One study by Seeman (1963) concerning social learning of inmates in a federal reformatory and another study by Seeman (1967) in which he hypothesized that externals would possess inferior knowledge in control-relevant areas of their experience seem to convey the message that internals are more knowledgeable, at least in terms of personally relevant information, than are externals. Such knowledge is essential if individuals are to seek to exert an effect on their surroundings.

If internals and externals differ in the amount and kind of information they acquire, they probably also differ in the very specific behaviors they use to achieve that information. Davis and Phares (1967) reasoned that if internals do possess a stronger generalized expectancy that reinforcements will be contingent upon their own behavior, they should more
actively seek relevant information so they can be better prepared to deal effectively with their world. Davis and Phares' (1967) results indicated that internals requested significantly more information than externals. Therefore, it may be fair to state that, consistent with Seeman's (1963; 1967) work, internals possess a higher level of knowledge, at least in part, because they more actively seek to acquire knowledge.

College women participated in an experiment by Pines and Julian (1972) that varied locus of control, task difficulty, and social evaluation. As anticipated, internals were more attuned to the task difficulty and the consequent pressure it exerted on information processing, while externals were more affected by the social demands characteristic of the situation. This led Pines and Julian (1972) to suggest that performance differences between internals and externals were not completely explicable in terms of belief in one's control over outcomes. Rather, internals and externals may adopt different strategies in the pursuit of valued goals.

**Personal Control.** The cognitive functioning of internals could enhance their personal effectiveness as
compared to externals. Phares et al. (1968) created a condition of threat by having groups of internals and externals respond to a series of personality tests. The subjects (college students) were subsequently presented with interpretations of their personalities that were rather negative, along with some positive feedback. After having an opportunity to digest their personality profiles, they were given a questionnaire which had remedial options listed.

Internals showed a significantly greater willingness to take overt remedial action to correct presumed shortcomings when presented the opportunity to do so. Whether one terms it action taking, confronting, or mastery, internals seem to be more disposed toward behavior that will enhance personal control.

Perhaps related to internals' feelings that they can control the environment is the feeling that they can control themselves. For example, Straits and Sechrest (1963) noted that nonsmokers were significantly more internal than smokers. James, Woodruff, and Werner (1965) replicated the finding of Straits and Sechrest (1963). In addition, they noted
that those male smokers who quit smoking and did not begin again within a given period of time were more internal than those who believed the Surgeon General's Report on the Hazards of Smoking but did not quit smoking. For females, the differences were not significant. There are many other complex determinants of smoking. Locus of control is only one.

Control over one's own behavior can be extended to include birth control techniques (Lundy, 1972; MacDonald, 1970). MacDonald (1970) showed that in single female college students (who were similar in their degree of sexual experience) there was a significant relationship between locus of control and birth control practices. Sixty-two percent of the internals reported practicing some form of contraception while only 37% of the externals did so. In the case of married females, data were in the same direction but failed to reach significance. Although statistically significant in this case, locus of control accounts for only a small portion of the variance.

Despite complications and potential qualifiers, the smoking and birth control studies suggest that an
internal orientation provides a greater potential for exercising the kind of personal control that will lead to valued outcomes. Such differential behavior is further evidence of the superior planning ability of internals, an ability that appears to pay off in greater benefits. A series of studies by Ryckman and his colleagues (Ryckman & Rodda, 1971; Ryckman, Rodda, & Stone, 1971; Ryckman, Stone, & Elam, 1971), Phares and Wilson (1971), and Rotter and Mulry (1965) all illustrate the motivational nature of locus of control.

Internals manifest greater concern and attach more importance to success in skill or other self-reliant situations while externals are prone to be more motivated by chance or luck situations. If this is the case, then the differential behavior of internals and externals is based not only on their different generalized expectancies regarding the locus of control of outcomes but also on differences in motivation and needs. Just as social learning theory is a cognitive and motivational theory, so does locus of control seem to have cognitive and motivational aspects.

**Internals—A Description.** A capsule description of internals is that they are more cognitively active.
They exhibit better learning and acquisition of material, more actively seek information, show a superior utilization of information or data once it is acquired, and are more attentive, alert, and sensitive than externals. Internals seem to be more concerned with informational demands than with any of the presumed social demands upon which the externals capitalize.

The superior mastery and coping of internals seems to be due to their superior cognitive processing activities. They seem to acquire more information, make more attempts at acquiring it, are better at retaining it, are less satisfied with the amount they possess, are better at utilizing it and devising rules to process it, and generally pay more attention to relevant cues in the situation. There is clear evidence that internals are more active in attempting to control their environments. Behavior appears to be mediated by their belief in the efficacy of their own efforts or by a desire or need to remain in control.

Self-Efficacy

One variable that has received a great deal of attention in the locus of control, pain, treatment
outcome, and adherence literatures is self-efficacy expectations, another predominantly internal belief. A self-efficacy expectation is defined as a personal conviction that one can successfully perform certain required behaviors in a given situation (Bandura, 1977). It has been argued that it is an individual’s belief about his/her efficacy that principally determines whether a given behavior will be attempted (Bandura, 1977).

In this approach the occurrence of coping behaviors is conceptualized as being mediated by an individual’s belief that situational demands do not exceed cognitive and behavioral coping skills. Individuals with weak efficacy expectancies are viewed as less likely than individuals with strong expectancies to emit coping responses, and are less likely to persist in such responding in the presence of obstacles and aversive expectancies. Given the necessary skills and incentives, it is efficacy expectancies that are posited to be the determinants of behavior and perseverance (Bandura, 1977).

Mastery experiences gained through performance accomplishments are hypothesized to have the greatest
impact on establishing and strengthening expectancies because they provide the most information about actual capabilities (Bandura, 1977). Bandura (1977) further suggests that those techniques that enhance mastery experiences the most will also be the most powerful tools for bringing about behavior change. He proposed that cognitive variables are the primary determinants of behavior, but that these variables are altered most effectively by performance-based accomplishments. Self-efficacy is believed to be critical because it influences the degree of effort and persistence put forth in the face of challenging situations (Bandura, 1977; Marlatt, 1985). A return to self-efficacy as it relates to locus of control, pain, treatment outcome, and adherence will occur later in this review.

Development of the Health Locus of Control (HLC) Scale

As mentioned earlier, Seeman and Evans (1962) found that hospitalized tuberculosis patients who held internal locus of control beliefs knew more about their own condition, questioned doctors and nurses more, and expressed less satisfaction with the amount of feedback or information they were getting about their condition from other hospital patients. This study appeared
before Rotter's (1966) publication of the I-E Scale, and, in fact, used an earlier version of that scale.

In a similar vein, work by DuCette (1974) and Lowery and DuCette (1976) showed that among newly diagnosed diabetics, internals knew more about their condition than did externals. This finding did not hold for long-term diabetics, where no differences in information between internals and externals were found. Because DuCette’s (1974) and Lowery and DuCette’s (1976) data were cross-sectional, conclusions about changes over time must be drawn with caution.

DuCette (1974) investigated other health behaviors as well. Contrary to his prediction, he found that long-term diabetics who were internal missed an increasing number of doctor appointments and began to ignore their diets. He hypothesized that the uncontrollable, unpredictable aspects of diabetes leads internals to find their normal response inadequate; that when knowledge does not lead to control, internals respond by relinquishing the degree of control they might maintain.

Investigating locus of control in relation to specific health behaviors is one aspect of the value of
this construct. In an early paper, Wallston and Wallston (1973) noted that individualizing patient treatment based on locus of control beliefs was a potentially important utilization of the construct.

At the American Public Health Association meetings in San Francisco, Wallston and Wallston (1973) presented a paper in which they conceptualized the intent of many health education efforts as internality training programs. In that paper, they also advocated evaluating the effectiveness of these health education programs by means of the health-related measure of locus of control beliefs that they were just beginning to develop. They referred to Rotter's own writings (1960; 1966) in which he advocated taking the situation into account when devising measures of expectancy for their rationale in developing a health-specific measure.

The original Health Locus of Control (HLC) Scale (Wallston et al., 1976) was in a 6-point Likert format. These 11 items were the product of an item analysis based on the responses of 98 college students to a pool of 34 items written as face-valid measures of
generalized expectancies regarding locus of control beliefs related to health.

Congruent with most other measures of locus of control, the HLC Scale was scored so that high scores indicated agreement with externally worded beliefs. Individuals with scores above the median were labeled "health externals," presumed to have generalized expectancies that the factors that determine their health were ones over which they have little control. Scoring below the median, were the "health internals," who believe that locus of control for health is internal and that one stays sick or becomes healthy as a result of his/her own behavior. Concurrent validity of the HLC Scale was evidenced by a .33 correlation (p<.01) with Rotter's I-E Scale for the original development sample.

The shared variance (10%) with Rotter's more established measure of locus of control was kept purposely low to enhance its discriminant validity, thus meeting the requirement that a new test not correlate too highly with measures from which it is supposed to differ (Campbell & Fiske, 1959). The
instrument was published in the *Journal of Consulting and Clinical Psychology* in 1976.

**Development of the Multidimensional Health Locus of Control (MHLC) Scale**

After utilizing the HLC in a half dozen or so studies, Wallston and Wallston (1973) began to question their original decision to treat health locus of control as a unidimensional concept. Based on an earlier finding cited by MacDonald (1973) that a factor analysis of a Likert format locus of control scale produced a first factor consisting almost entirely of externally worded items, a number of HLC protocols were rescored to form two subscales: HLC-I consisted of five items worded in the internal direction and HLC-E consisted of six items worded in the external direction. The correlation between these two subscales was essentially zero.

Item analysis of the subscales revealed that the alpha reliability of HLC-E was approximately the same as for the total 11-item scale and the alpha for HLC-I was even higher, though based on only five items (Wallston et al., 1976). Thus, it seemed that at least two health locus of control dimensions existed.
Questioning the conceptualization of locus of control as a unidimensional construct, Levenson (1973c; 1974; 1975) argued not only that internal beliefs were orthogonal to external beliefs, but that understanding and prediction could be further improved by studying fate or chance expectations separately from external control by powerful others. Levenson (1973a) constructed three 8-item Likert scales (Internal, Powerful Others, and Chance—the I, P, and C Scales) in order to isolate components of Rotter's I-E Scale that would lead to enhanced prediction capabilities. Her rationale was that people who believe the world is ordered should logically be expected to behave differently from those who feel that powerful others are in control. Such appears to be the case in many situations. The three new scales have been used to study certain behaviors in psychiatric patients (Levenson, 1973c) and parental antecedents of I-E beliefs (Levenson, 1973b) as well as measure generalized locus of control beliefs and demonstrate initial evidence of their discriminant validity.

Like Rotter's I-E Scale (1966), Levenson's new scales did not include items specific to expectations
about health. Since Levenson demonstrated the utility of measuring three distinct dimensions of locus of control, there was reason to model new health-specific locus of control scales after her work.

**Multidimensionality of the HLC.** Of the six externally worded items on the original HLC Scale, only one was conceptually related to the dimension of powerful others externality. New items tapping this dimension were necessary. The HLC Scale also included a mixture of items tapping personal and general control ideology, but a strong case was made by Levenson that beliefs about people in general should have less predictive power than beliefs about one’s own control. Therefore, a decision was made to reconceptualize health locus of control along multidimensional lines paralleling Levenson’s work and to develop new scales consisting only of personally worded items.

One additional purpose of this new scale, development effort was to create equivalent forms of the Health Locus of Control scales. Many research designs call for repeated measurement of locus of control beliefs and equivalent forms of the instrument would decrease the possibility of individuals
remembering their previous responses and would thus increase the instrument's sensitivity to changes in beliefs over time.

Starting with the 11 items which constituted the original HLC scale, new items were written which, on a prior basis, reflected three dimensions of health locus of control beliefs: internality (IHLC); powerful others (PHLC); and chance externality (CHLC). The new items were all written in the personal mode. The actual item pool reading level, calculated using the Dale-Chall formula, was fifth-sixth grade. The total item pool consisted of 25 IHLC items, 30 PHLC items, and 26 CHLC items.

In a booklet format the 81 health locus of control items were mixed with Levenson’s I, P, and C scale items, a shortened 10-item version of the Marlowe-Crowne Social Desirability Scale, and two items tapping health status. All items utilized a 6-point, Likert-type format, ranging from Strongly Disagree (scored as one) to Strongly Agree (scored as six). In order to control for item placement, two versions were printed so that the items appearing first in one version came last in the other and vice versa.
Persons over 16 years of age who were waiting at gates in a metropolitan airport were approached by a research assistant who briefly described the study and asked if they would be willing to fill out the booklet. One hundred twenty-five booklets were completed and returned by mail or handed to the research assistant at the airport.

**Statistical Properties of the MHLC.** Separate item analyses were run on the pools of IHLC, PHLC, and CHLC items. The following criteria were used to select items which would compose the new scales: item mean close to 3.5, the midpoint; wide distribution of response alternatives on the item; significant item-to-a-prior scale (minus the item) correlation; low correlation with the chosen measure of social desirability; and item wording. This last item was used to construct equivalent forms of the new scales.

Using the above criteria, six pairs of items (with items paired on the basis of meaning) were chosen for each of the three new scales. To construct the equivalent forms of each scale, items within each pair were assigned to a Form A or a Form B in such a way as to make the total scores of Forms A and B as identical
as possible. This new scale was named the Multidimensional Health Locus of Control (MHLC) Scale (see Wallston et al., 1978 for a complete description).

Alpha reliabilities for the MHLC scales (6-item forms) ranged from .673 to .767. When Forms A and B were combined into 12-item scales, the alpha reliabilities increased: .830 to .859. These reliabilities compared favorably with Levenson’s 8-item I, P, and C Scales: .508 to .733. Because they were constructed that way, the mean scores of Forms A and B of each MHLC scale were nearly identical.

The intercorrelations of the MHLC scales and the I, P, and C Scales of Levenson were such that each MHLC scale correlated most highly with its theoretical counterpart of Levenson’s scales. This was most clearly the case with the IHLC, which correlated significantly with the I scale. The PHLC correlated highest with the P Scale, but also correlated significantly with the C Scale. The CHLC correlated highest with the C Scale, but also correlated significantly with the P Scale and negatively with the I Scale.
Correlations of the MHLC scales with the demographic information obtained from the respondents produced no significant correlations with sex, and only one scale, Form A, of the PHLC, correlated significantly with age ($r = .198, p < .05$) or educational level ($r = .222, p < .05$).

As an initial indication of predictive validity, correlations were computed between health status and the MHLC scores. Health status, which includes such things as weight, occurrence of disease, and health history, correlated positively with IHLC ($r = .403, p < .001$), negatively with CHLC ($r = -.275, p < .01$), and did not correlate with PHLC ($r = .055$).

With the development of the MHLC scales, health researchers had at their disposal a set of instruments with greater potential than the original unidimensional HLC scale. Not only could scores be obtained on three theoretically and empirically differentiated dimensions, but equivalent forms of the scales were available for research designs that required repeated administrations over short time intervals.

The problem of low alpha reliability encountered with the original HLC scale was postulated to not occur
with the new scales since the major factor contributing to low internal consistency, combining internal and external statements into the same measure, had been eliminated. The new scales had also been developed using a more representative sample of respondents than the group of college students on whom the psychometric properties of the original scale were established.

Development of the Pain Locus of Control (PLOC) Scale

Toomey, Wingfield, Mann, and Abashian (1988) revised the Multidimensional Health Locus of Control (MHLC) Scale to assess perceived control of pain rather than health. Two groups of chronic pain patients (myofascial low back pain (MLBP) and mixed headache disorder) were compared with nonchronic pain (normal) volunteers. Results indicated lower internal locus of control scores for MLBP patients when compared with mixed headache patients or normal volunteers. These authors suggested that the quality of pain may affect the perceived ability to control pain and that pain clinic treatment of patients may require intensive cognitive retraining in addition to the more physically-based pain relief modalities.
Toomey, Lundeen, Mann, and Abashian (1988) revised the item content of the MHLC to assess personal control of pain, naming it the Pain Locus of Control (PLOC) Scale. A group of normal volunteers was compared with a group of chronic pain outpatients. Results revealed significantly higher scores on the internal locus of control dimension in the normal group and higher chance dimension scores in the patient group. These authors affirmed that the results supported the construct validity of the PLOC and suggested that chronic pain patients report greater deficits in personal control of pain and greater control of pain by fate when compared to normal volunteers. Results support the use of intervention strategies for chronic pain patients designed to foster establishment of perceived control of pain.

Toomey, Lundeen, Mann, and Abashian (1988) used the PLOC to compare two groups of patients with chronic pain in different anatomical sites: temporomandibular joint dysfunction patients (TMJ) and MLBP patients. Results indicated significantly lower internal control scores for MLBP patients as compared to TMJ’s, and higher powerful others scores for MLBP patients when
compared with TMJ's. The authors suggested that results indicated that differences exist between MLBP and TMJ patients in attribution of control of pain and suggested that interventions which stress independent management of pain may be especially effective with TMJ individuals.

Statistical Properties of the PLOC. Toomey, Mann, Abashian, and Lundeen (1989) used the PLOC to assess the perceived control of pain in chronic pain patients at pre-treatment. High and low internality groups were created by splitting I (internal) scores at the median. Significant differences were found between High and Low I groups on the variables of average pain intensity ($t=3.53, p<.001$), percent time in pain ($t=2.47, p<.05$), and report of pain free periods ($t=2.94, p<.05$).

Penzien et al. (1989) administered the PLOC to chronic pain patients at pre-treatments. Alpha reliabilities for the PLOC Internal, Powerful Others, and Chance subscales (.81, .80, and .79, respectively, Form A) approximated the reported reliabilities of the MHLC. Split-half reliabilities (Spearman-Brown) revealed that responses for Form A and Form B subscales were consistent (.89 for Internal, Powerful Others, and
Chance). Intercorrelations of the three subscales indicated the dimensions were not altogether statistically independent.

The Powerful Others subscale was significantly correlated with the Chance and Internal subscales (r=.30 and r=.20, respectively). The Internal and Chance subscales were not significantly correlated (r=.08). The I subscale was negatively correlated with the McGill Pain Questionnaire Affective Score (r=-.20, p<.05), and also with a self-rating of depression (r=-.22, p<.021). Powerful Others correlated with pain frequency (r=.27, p<.005).

In addition, Powerful Others highly and positively correlated with the Sickness Impact Scale scores (Physical: r=.74, p<.001); (Psychological: r=.58, p<.014); (Total: r=.74, p<.001). Chance was correlated with two pain indices, the McGill-Sensory (r=.29, p<.004) and pain frequency (r=.26, p<.007). Chance was also positively correlated with a self-rating of depression (r=.23, p<.02) and the Sickness Impact Scale Physical score (r=.54, p<.025). Finally, Chance was correlated with age and gender
(younger patients and males produced higher PLOC Chance Scores than older patients and females).

A recent study by Toomey, Mann, Abashian, and Thompson-Pope (1991) focused solely on the internality dimension of the PLOC because of the potential use of that factor as a measure of pain coping. This study was conducted in an outpatient chronic pain clinic setting and compared high and low scorers on the internality dimension of the PLOC on measures of pain intensity, frequency, and pain-related functioning (i.e. health care utilization, functional interference due to pain, and vocational functioning).

No differences between groups were noted on the variables of age, education, or sex. There was a zero-order correlation ($r = -.07$) between internality scores and pain duration. Patients reporting greater personal control of pain (High I group) rated as significantly lower their average pain level and least pain level than patients reporting less personal control of pain. Additionally, patients in the High I group were significantly more likely to report some time without pain and to report lower percentage of time spent in pain. There were no significant
differences between the two internality groups on reported pain-related health care interventions, interference with functioning due to pain, or pain-related job change.

The Pain Experience

If one transfers attention to specific aspects of the pain experience, the experimental and clinical literature (see Sternbach (1978) for a more complete discussion) reveals a significant difference between acute and chronic pain. Acute pain is typically associated with changes in autonomic activity roughly proportional to the intensity of the stimulus. There are increases in cardiac rate and stroke volume, systolic and diastolic pressures, pupillary diameter, gut motility, salivary flow, and superficial capillary flow. There are associated changes in bronchiole diameter and release of glycogen, epinephrine, and norepinephrine.

The overall pattern is one of emergency reaction, the fight-or-flight response. Patients with acute pain usually experience anxiety, either about the severity of the pain itself, or about the meaning of the pain. When anti-anxiety medications are given, or other
anti-anxiety maneuvers are performed, such as explanations or reassurances, patients report less pain. Manipulations which reduce anxiety also diminish pain responses (Sternbach, 1978).

Chronic pain presents a rather different picture. If the pain is constant rather than intermittent, there appears to be an habituation of the autonomic responses. Patients report sleep disturbance, appetite changes, decreased libido, irritability, withdrawal of interests, weakening of relationships, and increased somatic preoccupation.

Acute pain presents a different set of circumstances from chronic pain. When pain and the associated symptom complex persists for long intervals, there is inherently present an increased opportunity for learning and conditioning effects to exert influence. Some of symptoms associated with the pain are behaviors.

In the case of pain, for example, such actions are grimacing, moaning, verbalizing the experience of somatic distress, limping, and asking to be helped with or relieved of a pain-aggravating task. Those behaviors are subject to learning and conditioning
effects, just as is true for other kinds of behavior (Fordyce, 1974; Fordyce, Fowler, Lehman, & DeLateur, 1973).

The originating "cause" for these symptom behaviors to begin to occur is not important for this present study. What is important is that the symptoms have persisted across time and that they have occurred in a set of circumstances conducive to learning and conditioning. Chronicity of pain provides two of the essentials for conditioning; namely, that symptom behaviors occur and that they continue to occur for a few weeks, months, or years. A third essential of conditioning, circumstances (or the psychological situation) conducive to conditioning, may or may not exist in the context of a given person's chronic pain condition. It is enough for now to note that if those circumstances do exist, they will have an opportunity to exert influence.

When pain is acute, there is little need for the patient, or those around him/her, to make major or lasting changes in his/her behavioral repertoires. The reduction of pain behavior leads almost automatically to a return to "well behaviors," behaviors that
characterize pain relief and enjoyment of activities with no resultant pain experiences.

The situation in chronic pain is often quite different. The fact of chronicity means that both the patient and those around him/her will have had to establish and persist in the exercise of many pain-related behaviors. Family members will have had to shift their repertoires, as well, to accommodate the demands of the pain and the changes in social, avocational, and household maintenance activities produced by the injury (Sternbach, 1978).

When healing has occurred and the disability has run its course, the process of shifting back to a well behavior repertoire can be and often is a formidable task. When pain has persisted for several years, reduction of pain behaviors by no means automatically leads to replacement with effective well behavior. Effective treatment of must address the task of reducing pain behavior and increasing or reestablishing effective well behavior (Sternbach, 1978).

The Pain Experience as a Multidimensional Experience

The rationale for treating chronic pain via behavioral methods is based on several assumptions.
First, the pain behaviors may now be occurring for reasons partially or totally unrelated to nociceptive (potentially tissue-damaging thermal or mechanical energy impinging upon specialized nerve endings of A delta and C fibers) stimuli arising from a site of body damage, irrespective of what may have initiated those pain behaviors at the time of onset. Secondly, evaluation through behavioral analysis must indicate a systemic relationship between pain behaviors and contingent reinforcement (Sternbach, 1978).

Objectives of treatment, in behavioral terms, while varying from patient to patient according to immediate circumstances, usually are encompassed in the following: (a) increase in activity level, both generally and in regard to specific exercise or activity constraints; (b) reduction of pain behaviors evocative of protective actions by others; (c) restoration or reestablishment of effective well behaviors, including remediation of social skills and interpersonal problems previously limiting the ability to be effectively well; (d) modification of the reinforcing contingencies to pain and well behavior existing in the patient’s immediate surroundings; and
(e) reduction in pain-related medication consumption (Sternbach, 1974).

**Behavioral Coping Components.** Common treatment components in many pain clinics include relaxation training, physical therapy (active exercise), cognitive restructuring, stress management, coping strategies training, problem solving training, communication skills and assertion training, training in appropriate posture and body mechanics, energy conservation, nutrition counseling, anger management, behavior modification to decrease verbal pain complaints and other pain behaviors while increasing well behaviors, goal setting, and medication reduction (Sternbach, 1974).

Exercise lies at the core of treatment. Exercise programs are individualized according to the particulars of each patient. The procedure is to establish tolerance for each prescribed exercise by direct observations. Then there is a shift from exercising until pain, weakness, or fatigue encourage one to stop (i.e. exercising to tolerance wherein rest is pain-contingent) to a quota system wherein rest becomes work-contingent. Initial quotas are well
within the patient's demonstrated current capabilities but are raised systematically on a preset basis (i.e. one additional repetition per session) until a predetermined ceiling is reached (Sternbach, 1974).

Those around the patient (nurses, physical therapists, physicians) adopt an interactional style in which pain behaviors receive minimal social attention while activity, exercise, or attempts at well behavior, are responded to with appropriate social reinforcement. The combination of shifting social reinforcement from pain behavior and inactivity to exercise and expanding activity and of systematically working to replace immobilization and constrained motion with vigorous and expanding motion aims at replacing pain behavior with well behavior (Sternbach, 1974).

Pain-medicated patients cannot be evaluated adequately until that condition is cleared. Two methods have been used. In both cases, there is a period of direct observation during which current medication consumption and needs are identified precisely by giving the patient free access to pain-related medication (i.e. a medication baseline is obtained). The medications the patient uses are
incorporated into a single mix of active ingredients and a color and taste-masking ingredient, such as cherry syrup. Active ingredients are reduced systematically while exercise and activity level are expanded. Tranquilizers are eliminated at the outset. The regimen is explained fully to the patient at the outset, except for the precise schedule of decreases in the active ingredients in the mixture (Sternbach, 1978).

**Cognitive Coping Strategies.** Keefe (1988) states that most people who have experienced pain for some time develop ways to tolerate, minimize, or reduce it. These behaviors, termed pain coping strategies, include involvement in distracting activities, focusing on pleasant events, reductions in activity, attempting to ignore the pain, and saying calming statements to oneself. The coping strategies people use over prolonged periods of time may significantly affect functioning. People who create effective coping strategies may manage their pain well and be able to lead active, productive lives. Those who rely on ineffective coping strategies may be more seriously impaired by pain and lead more limited lives.
Rosensteil and Keefe (1983) devised the Coping Strategy Questionnaire (CSQ), a self-report method, to assess the extent to which chronic low back pain patients reported using six cognitive coping strategies and two behavioral coping strategies when they felt pain. The patient was asked to rate how frequently he/she used the coping strategies and to rate how much control he/she felt he/she had over the pain on an average day. Finally, the patient was asked how much he/she was able to decrease the pain at all.

Results indicated that the questionnaire was internally reliable. Patients reported using praying or hoping and calming self-statements most frequently. Individuals rated their overall ability to control and decrease their pain as a mean of 2.37 and 2.38 on a 7-point scale, respectively. Three factors accounted for a large proportion of variance in responses: Cognitive Coping and Suppression, Helplessness, and Diverting Attention or Praying. These three factors were predictive of behavioral and emotional adjustment to chronic pain above and beyond what may have been predicted from an analysis of patient history variables.
or patients’ tendency to interpret all events as having a concurrent bodily reaction.

Gross (1986) utilized the CSQ to assess the use of coping strategies in back pain patients prior to undergoing a laminectomy procedure. Three factors, Self-Reliance, Loss of Control, and Active Coping and Suppression accounted for a large proportion of the variance in questionnaire responses. Specifically, patients high on Self-Reliance and Loss of Control rated their pain as significantly less and the operation as having a positive outcome than those patients low on these two factors.

Turner and Clancey (1986) assessed the effectiveness of a group outpatient cognitive behavioral and operant behavioral treatment program for chronic low back pain patients. Significance associations were found between the use of ignoring and reinterpretation strategies and downtime, between the use of attention diversion strategies and pain intensity, and between tendency to catastrophize and physical and psychosocial impairment.

Keefe et al. (1987) investigated the relation of pain coping strategies to pain, health status, and
psychological distress in a group of osteoarthritis patients with chronic knee pain. Factor analysis of the CSQ revealed two factors: (a) Coping Attempts and (b) Pain Control and Rational Thinking. These factors accounted for 60% of the variance in the CSQ responses. Regression analysis, controlling for demographic and medical variables, identified the Pain Control and Rational Thinking factor as a significant predictor of outcome measures. Patients scoring high on this factor had lower pain levels, better health status, and lower levels of psychological distress.

Remediating or establishing effective well behavior is the most difficult part of the process and the mission most likely to fail. Most chronic pain patients have significant problems or gaps in their ability to be effectively well. It is not appropriate that this paper attempt to catalog either the problems encountered or the treatments applied. It should suffice to note that an evaluation of chronic pain patients must examine the issues of problems or gaps in well behavior repertoires and of identification of post-treatment activities in which the patient is involved. In light of that evaluation, treatment must
do what it can to take effective action to remediate, as needed.

The Interdisciplinary Pain Center Approach

Psychosocial theories of pain emphasize the rehabilitation aspects of the pain situation. The primary focus is on helping the patient develop a more effective way of coping and restore former roles and functions. Pain treatment advanced with the work of Fordyce et al. (1968). He and his colleagues demonstrated the role of conditioning in chronic pain by producing changes in chronic pain patients through behavior modification. Once research showed that learning processes deeply influence the pain experience (e.g. Brena, 1981; Fordyce, 1968; Fordyce, 1973; Phares, 1962), a whole new approach to pain management emerged: the concept of pain control through rehabilitation based on techniques of behavior modification, the so-called "pain clinic approach" (Brena, 1983).

The concept of a specialized unit devoted to the diagnosis and treatment of chronic pain was proposed by Bonica (1953). In 1968, Fordyce published his first report on operant conditioning in the treatment of
pain. In 1973, he reported the first follow-up study on the efficacy of a pain center. Because of Fordyce's work and the establishment of a professional pain organization in 1973, the growth of specialized units for the management of chronic pain has increased rapidly over the last decade. Turk, Meichenbaum, and Genest (1983) indicated that the number of pain clinics in the United States has increased to 800.

Fordyce et al. (1968) described the first operant treatment program for chronic pain in an inpatient rehabilitation setting. Treatment goals included reducing maladaptive behaviors, increasing activity levels, and eventual elimination of analgesic medications. Grimacing, moaning, and guarding were ignored. Environmental control reduced the possibilities for avoiding aversive activities, such as work and activity, that were perceived as painful. The regimen avoided indirect reinforcement of avoidant behaviors with a deliberate attempt to ignore patients' feelings, thoughts, and other cognitive events since doing so might have reinforced pain behavior.

Most pain programs include biofeedback and other types of muscle relaxation training, group and
individual exercise periods, gradual reduction and elimination of pain-related medications, group discussions of pain-related topics, and contingency contracting. Family member participation and/or family therapy, behavioral modeling, vocational counseling and work experience training, informal lectures and discussions of self-help techniques are all designed to encourage the patient to accept responsibility for achieving and maintaining well behavior. Assertiveness training and other cognitive behavioral coping techniques, individual psychotherapy, hypnosis, physical and occupational therapy and sympathetic nerve blocks are additional treatment modalities used.

Treatment Outcome Studies

Only recently have pain programs begun to evaluate treatment outcome. Post-treatment only and pre-treatment to post-treatment studies have shown that significant changes take place when patients are treated at pain management centers (Aronoff, Evans, & Pincus, 1983; Latimer, 1982; Turk et al., 1983).

The number of published treatment outcome studies for chronic pain has grown rapidly in recent years and there are some qualitative and quantitative reviews of
these studies (e.g. Turk & Rudy, 1991). In general, reviews that evaluate the efficacy of chronic pain treatment programs have been consistent in reporting initial improvement in many individuals. Follow-up data suggest that typically 30% to 70% of the patients treated maintain gains over a one-to-five year period, but then between 30% and 70% relapse (Keefe et al., 1986).

Cinciripini and Floreen (1982) reported successful six-month and one year follow-ups of patients treated in an inpatient setting. At the termination of treatment over 90% were not taking any medication; however, at six-month and one year follow-ups, only 61% and 55% of the patients were free from medication, respectively. Self-reported frequency of relaxation exercises was 5.7 and 4.8/week and frequency of a physical therapy routine was 3.2 and 3.0/week, at six-month and one year follow-ups, respectively.

Malec, Cayner, Harvey, and Timming (1981) followed 40 patients (32 responded to at least some of the questions) from six months to three years post-treatment. Based on a stringent set of criteria, 37% were judged to be successes (on individual
variables, 57%–86% met separate criteria of success). On self-report questionnaires, only 14% reported that they continued all of the physical therapy exercises prescribed, 32% were doing 50%–99%, 40% were doing 1%–50%, and 14% had discontinued exercise completely.

Philips (1987) reported good one year maintenance following a nine-week outpatient program that focused on self-efficacy, self-control, and skills training. At post-treatment (n=25) to one year follow-up (n=9), 80% to 87% exercised 20–30 minutes, 3–7 times/week. Aronoff et al. (1983) mailed 206 questionnaires for follow-ups between three months and one year and achieved only a 36% return rate. Of this sample, 72.4% reported having continued their physical exercise and 68.1% practiced relaxation on a daily basis.

Treatment Outcome Studies and Self-Efficacy

Neufeld and Thomas (1977) examined the effects of providing false efficacy feedback to subjects using relaxation to cope with laboratory-induced pain. Subjects who had received relaxation training plus positive efficacy feedback tolerated the pain significantly longer and had higher pain thresholds than subjects given low efficacy feedback. Dolce et
al. (1986) reported that self-efficacy expectancies and pain tolerance times following treatment were both found to predict follow-up performance one week later. These data suggest that self-efficacy expectations may have a causal role in behavioral response to pain stimulation. If patients perceive some benefit they are more likely to engage in recommended behaviors.

Dolce, Crocker, and Doleys (1986) observed that chronic pain patients' post-treatment self-efficacy ratings were significantly correlated with exercise levels, medication use, and work status at follow-up periods that ranged from six months to one year. Dolce and his colleagues have suggested that if self-efficacy expectancies are related to maintenance, then those patients who do not increase their perceptions of self-efficacy following treatment, despite any other post-treatment improvements, are likely to be good candidates for recurrent pain. Stevens, Peterson, and Maruta (1988) also emphasized the importance of an individual's perceptions of his/her pain and suggested that individual differences in perceptions associated with post-treatment improvements may be useful predictors of patients prone to recurrent pain.
Philips (1987) found a significant correlation between patients' self-efficacy and self-rating of the magnitude of their pain problem at one year follow-ups. In this study, treatment produced a 25% increase in self-efficacy, and as self-efficacy increased, avoidance of pain behavior was diminished. The dramatic change in the relationship suggests the possibility that an important effect of treatment is the development of a sense of control over pain (Philips, 1987). The increased exercise levels and reduced avoidance achieved by these patients may be the crucial therapeutic effect.

Treatment Outcome Studies and Internal Locus of Control

Nitti (1981), using a single-subject design, found that chronic pain patients scoring in the mid-external range on Rotter's Locus of Control Scale (1966) demonstrated significant changes toward internality after EMG biofeedback treatment. He did not find a positive relationship between patients' locus of control scores and pain levels after biofeedback treatment nor did he find a positive relationship between locus of control scores and pain medication intake after biofeedback.
Hudzinski and Levenson (1985) utilized a specialized version of the Levenson Internal, Powerful Others, and Chance Locus of Control Scales (1973a) to measure expectations of control with regards to pain. They found that chronic headache patients suffering the most from biofeedback behavioral treatment at follow-up had an internal locus of control. In addition, with age, sex, education, and number of sessions controlled, locus of control proved to be a significant predictor of 20-month post-treatment outcome.

Toomey, Lundeen, Mann, and Abashian (1988), using the MHLC with facial pain patients at pre-treatment, found that people attributing health locus of control to Powerful Others were older, compared to I and C groups. Penzien et al. (1989) used the PLOC at pre-treatment and found that younger patients and males produced higher Chance scores than older patients and females.

Hudzinski and Levenson (1985) found that those chronic pain patients that benefitted the most from biofeedback behavioral treatment of headaches at follow-up were under 40 years of age and had an internal locus of control. Older people were less
successful in headache reduction and showed greater external locus of control.

It is logical to expect that younger patients would respond better to treatment than older people (Hudzinski & Levenson, 1985) since they may be less conditioned to a pattern (cycle) of pain by virtue of having experienced fewer years of their particular pain ailment. It also seems reasonable to think that persons high on the Powerful Others orientation would be older since listening to and following the advice of physicians for management of pain has been the traditional way to relieve pain.

**Treatment Outcome Studies in Interdisciplinary Pain Centers**

In a study by Ignelzi, Sternbach, and Timmermans (1977) 54 patients, divided into those who received surgery and those who did not, were evaluated. The patients were treated in a multidisciplinary pain clinic program with follow-up data obtained three years after admission. Results implied that in all cases for both groups, pain levels and analgesic intake were reduced greatly, whereas activity levels were greatly increased. In the surgery group, 35% returned to
regular work or activity and 27% had further hospital visits for pain. In the other group, 27% returned to work or regular activity and only 6% returned for hospital visits due to pain. Other measures revealed no significant differences between the groups.

A problem with Ignelzi et al.'s (1977) study is that the authors did not tell how the results were obtained. Therefore, this comparison does not provide an assessment of the efficacy of a multidisciplinary pain clinic. Since both groups were patients in the program, differential effects of the pain clinic could not be investigated.

Two studies were done by Rosomoff, Green, Silbert, and Steele (1981) and Chapman, Brena, and Bradford (1981) using compensation-related comparison groups. Rosomoff et al. (1981), by telephone interview, compared 52 patients who participated in the Low Back Rehabilitation program at the University of Miami School of Medicine. They developed three levels of functioning to determine whether activity level was in the presence or absence of discomfort, and whether the patient was or was not taking medication. Eighty-six percent were at Level 1 (full functioning) at
follow-up, 12% were at Level 2 (capable of self-care only) and only one patient described himself as severely restricted (Level 3). No difference in the degree of improvement was found between the compensation and non-compensation groups.

Chapman et al. (1981) selected 100 patients at random who had completed the program at the Pain Control Center at Emory University. The patients were divided into three groups. The Pending Disability Group (n=40) had an attorney and an upcoming disability hearing or had filed a lawsuit. Twenty-three patients, the Current Disability Group, had already been approved for and were receiving long-term disability payments. The No Disability Group included 12 patients working for pay, two who were unemployed, but not applying or receiving disability, and 23 who were housewives or retirees (n=37). Assessment was made with an activity sheet on which patients reported the time in minutes they spent at various activities, a medication record, a visual analogue pain intensity (VAS) rating, and the McGill Pain Questionnaire.

As a pre-treatment to post-treatment follow-up study, they found that the VAS ratings on a scale of
100 dropped from 72 to 50 at the time of follow-up, an average of 21 months after the end of the program. Patients increased activity from 224 minutes per day before the program to 368 minutes per day after the program. Before treatment 14.6% of the patients were using no medications, 32.9% were using one type of medication and 52.4% were using more than one medication. At follow-up, 46.9% of the patients used no medication, 28.1% one, and 25.1% two medications or more. As a comparison group study, the investigators found no difference among groups of patients with pending, current, or no disability compensation.

Efficacy Studies of Interdisciplinary Pain Centers

Only a few studies have used control groups to determine the efficacy of pain management centers (Roberts & Reinhardt, 1980; Sturgis, Schaefer, & Sikora, 1984). Roberts and Reinhardt (1980) used a stringent criteria of success: (a) male subjects must be employed unless retired; (b) retired males must be able to function to personal and family’s satisfaction in other roles, such as husband, father, maintenance person around the house etc., and be physically active at least eight hours per day; (c) women were required
to be employed if it were necessary for personal or children’s support; (d) married women not gainfully employed were required to function in their chosen roles of homemaker, mother, volunteer, etc. to personal and family’s satisfaction and to be physically active at least eight hours per day; (e) subjects must not be receiving any compensation for pain problems whether employed or not; (f) subjects must not have had any pain-related hospitalizations or surgeries since treatment; and (g) subjects must not be using any prescription analgesics, sedatives, muscle relaxants, or tranquilizers.

They found that 77% of the treated patients met these stringent criteria for success as compared with 5% of those who were rejected for treatment and 0% of those who refused treatment. They compared treated patients with those who were rejected for treatment and those who refused treatment. Generalization of this study to programs using an interdisciplinary approach is difficult since treatment followed an operant conditioning approach. The exclusion/inclusion criteria were very strict. No multivariate statistical procedures were used. Moreover, rejected patients and
those who refused treatment are not completely comparable to eligible and motivated patients.

Sturgis et al. (1984) found no differences between treated and untreated patients on a host of individual outcome variables such as visits to health professionals, health expenses, income levels, disability status, and litigation history. Control patients met the entrance criteria of an interdisciplinary program but did not participate for a variety of reasons, including lack of interest, lack of insurance coverage, opposition of spouses to further treatment, unwillingness to stay in the hospital, and difficulties with transportation to the hospital. The assortment of reasons for non-participation makes generalization of results problematic. These patients had different expectations and motivation levels and, therefore, may not represent an adequate control group.

Fordyce et al.’s (1973) study was significant because it recognized the importance of follow-up data in order to evaluate the efficacy of pain clinics. In response to a questionnaire, patients were asked to remember their status on level of pain, degree to which pain interfered with activities, the number of hours
spent reclining, and the medications they were taking. These authors reported a significant reduction in pain, significantly less interference with daily activities, and less time reclining because of pain. Too few patients responded to the medication questions for analysis.

In addition to using post-treatment measures only, a number of other methodological concerns emerged. The length of treatment varied among patients, screening criteria were not published, there was no indication of the number of patients who were excluded, and there was no comparison or control group used.

**Pre- and Post-Treatment Efficacy Studies.** Painter, Seres, and Newman (1980), by subjective report, found three-fourths of their patients viewed the pain center as helpful, while almost one-fourth had gains eradicated with the passage of time.

Seventy percent had been receiving compensation at the time of admission, whereas at follow-up, only 45% were receiving compensation. Seventy percent were unemployed compared to 48% at follow-up. Sixty-one percent reported they had no more medical care for their pain, while 17% implied they were seeking other
medical solutions. Twenty percent reported having returned to the use of narcotic medications which had been eliminated by the pain unit program.

McCann, Kedford, and Jacobs (1981) compared information obtained in hospital charts with medical questionnaires completed one year after discharge. Results indicated that at the time of follow-up, medication intake and utilization of medical services were significantly reduced. Gainful employment and performance of activities were significantly improved.

Anderson, Cole, Gullickson, Hudgens, and Roberts (1977) reported on the efficacy of an operant model program at the University of Minnesota. They reported that 75% of the patients (n=130) completing the program reported "leading normal lives without drugs" while five patients reported not leading "normal lives" when they were contacted six months to seven years after discharge. The methods by which patients were determined to be living a "normal life" were not specified. It was unclear how pre- and post-treatment measures were obtained and compared. Forty-six percent (60 of 130) of the patients referred for the program were accepted for treatment. Of those 60, only 37
(29%) chose to enter, with three of these dropping out prior to completion. As a result, when Anderson et al. (1977) reported that 75% of the patients treated were "leading normal lives," they were actually speaking of only 26 (19%) of the 130 patients screened over a seven-year period.

Sternbach (1974) studied self-report data on 61 patients seen six months after discharge. This group reported significantly less pain than at the time of hospital admission, with some increase following discharge. Activity levels increased following treatment, again with some decrease at discharge. Analgesic medication was significantly reduced at discharge and stayed reduced at follow-up. These results indicated that treatment effects were maintained reasonably well for at least six months.

Wang, Istrup, Nauss, Nelson, and Wilson (1980) sent out mailed questionnaires to 725 patients in an interdisciplinary outpatient pain clinic. Variables assessed were the patient’s belief in the benefit of treatment, pain intensity, medication used, daily activity, and ability to work. Forty-five percent of the patients believed their treatment had been of
benefit to them. Approximately half had no pain, mild pain, or were merely uncomfortable from their pain. Sixty percent reported decreased or no use of medication for their pain. Fifty-six percent noted that their activity was completed even if occasionally difficult. The number of patients able to work increased by 50%.

Crue and Pinsky (1981) reported on medication use, medical/surgical treatment for pain, pain ratings, and an open-ended questionnaire about chronic pain, general life outlook, and attitude. After four years, 38% were not using opioids, barbiturates, major and minor tranquilizers, or muscle relaxants. Thirty-one percent were using less of these same drugs than they had before admission and 31% were using more drugs. The data showed that two years after treatment, 89% had had no invasive or medical treatment for their pain. By four years, 87% had had no invasive treatment for their pain. Approximately half reported their pain was the same or worse than it had been prior to admission, while 50% said it had improved. By four years, their percentages had not changed. Seventy-five percent
seemed to have positive attitudes with regards to their pain and their general life.

In a study by Malec et al. (1981) the period of follow-up of patients who had completed their program was six months to almost three years post-treatment. They developed a stricter definition of success based on three criteria: (a) reported non-use of narcotic analgesics, muscle relaxants, and tranquilizers; (b) employment status (working or training), running a household, continuation of 50%-100% of the exercises in which they were trained and reported increase in recreational activity; and (c) no reported increase in pain. To be "successful," a patient had to respond positively on all three criteria; 37% were so judged.

Another example of the comparison of pre- and post-treatment measures is one by Vasridevan, Lynch, and Abram (1981). The status of 149 patients was assessed in the areas of activity level, subjective pain report, use of analgesic medications, rehospitalizations, and employment status. The percentage of changes seems similar to those of other studies: continued improvements of activity levels, subjective pain rating decrease, not using as many or
as much of analgesic medications, fewer additional hospitalizations, and rise in employment status.

Herman and Baptiste (1981) ran groups of patients who met once a week for eight weeks. Their program included an educational component, a skills-training phase, and an application phase. Variables included drug intake, "up time" per 24-hour period, employment status, perception of pain level, ability to cope with life, and the use of health services. They determined success by totaling score points in all the categories, but the method of determination was not discussed. They did state that the change had to be in excess of 39% to be considered successful. Of the 50 patients, 41 were deemed successes upon completion of the program. A strength of their program is that they used standardized instruments such as a VAS, the Beck Depression Inventory, and the I-E Scale. Unfortunately, they used these measures at admission and at discharge, but not as part of the follow-up study.

Another study that used pre- and post-treatment measures was conducted by Swanson, Maruta, and Swanson (1979). At discharge, patients were rated by many
staff members on modification of attitude, medication reduction, and improved physical functioning. Patients were considered a success if they obtained an average rating of 2.0 or better. Three months after discharge, self-report follow-up questionnaire data were obtained. Results indicated that 75% of patients rated 2.0 or better at discharge were still doing well. Swanson et al. (1979), at one year follow-ups, reported 65% of those same patients were considered to be doing well.

Perhaps the best studies to use pre- and post-treatment measures were conducted by Seres and Newman (1976) and Newman, Seres, Yospe, and Garlington (1978). In Seres and Newman's study (1976), 100 unselected, consecutively treated patients with low back pain were assessed three months after completion of the pain unit program. Upon admission, 87% had been taking prescription pain medication; at follow-up, 8% were on narcotic medications and 8% were taking non-narcotic prescription analgesics. At admission, the average ability for active straight leg raise on the affected side was 57 degrees; at discharge, 87 degrees; and at follow-up, 82 degrees. Sitting with legs straight and reaching for the toes was also
assessed. Upon admission, average distance between fingertips and toes was 17 cm, at discharge 3 cm, and at follow-up, 3.5 cm. Upon admission, average knee elevation was 72 degrees; at discharge, 115.5 degrees, and at follow-up, 120.2 degrees. At the follow-up interview, 80% of the patients stated they were no longer seeking medical care for their back problems.

Newman et al. (1978) continued the above study by reporting follow-up data two years later. Thirty-six patients were chosen for an 18-month follow-up evaluation on the basis of their geographical proximity to the Pain Center. Sitting fingertips to toes distance improved from 7.1 cm at admission to follow-up levels of 2.6 cm. Straight leg raise went from 56.9 to 73.0 degrees. Knee-to-chest measurement was 100.4 degrees at admission to 109.1 degrees at follow-up.

All of these results showed statistically significant improvement which was maintained for 18 months. Only three of the 36 were still seeking further pain treatment. A majority of patients reported that their pain intensity was about the same as at admission to the pain center. However, most of the patients stated they were better able to cope with
the continuing pain in the presence of higher activity levels and had greatly reduced the use of analgesic drugs. Thirty percent became employed during the follow-up period.

These two studies used objective physical measures to evaluate efficacy. Their weakness is that they did not assess typical pain outcome criteria such as pain levels, activity, and mood.

Although post-treatment only and pre-treatment to post-treatment follow-up studies have not and can not provide conclusive evidence for the efficacy of the pain center approach, they have made two important contributions. They have demonstrated that significant changes do take place in the lives of individuals treated at pain centers. In addition to subjective pain levels they have used outcome criteria consistent with the goals of the pain management center approach, that is, to return individuals to a normal lifestyle.

Successful versus Unsuccessful Patient Studies.
Maruta, Swanson, and Swanson (1979) studied pre-treatment differences between successfully and unsuccessfully treated patients. Two-tailed t-test and the chi-square test results indicated that the two
groups differed significantly on prior duration of pain, work time lost because of pain, number of surgical procedures related to pain, dependence on medication, and pain level at the beginning of the program. Success in pain management declined with the increase of prior duration of pain, work time lost, number of prior operations, drug dependency and level of pain at the beginning of the program. No significant differences were found between the success and failure groups on age, sex, marital status, amount of pain-related drugs taken, receipt of disability compensation, pain sites, and neurologic and orthopedic diagnosis.

Painter et al. (1980) compared their pre-determined 25 most successful with their pre-determined 25 least successful patients. The group reporting the greatest degree of post-discharge improvement was labeled the success group, and the group with the greatest deterioration was labeled failures. These authors found a number of differences between the two groups. Men were somewhat less likely to maintain gains than were women. Divorced people were more likely to continue improving after discharge
than other marital status groups. Although no significant correlation was found between age and long-term success, the relationship was curvilinear. 

Patients in their twenties were more likely to regress, as did those over fifty.

These authors cautioned against using any one of these variables alone in making admission decisions. They implied that their method of categorization capitalized on chance differences. This study also used only two highly subjective criteria in determining success or failure group membership.

Roberts and Reinhardt (1980) also examined differences between successfully treated and unsuccessfully treated subjects at baseline to determine if there were any variables which might have predicted outcome. Successfully treated patients reported lower levels of analgesic use, decongestants, vasoconstrictors, and total number of drugs used. They had pain problems for a shorter period of time. However, these results were difficult to interpret because of small sample sizes.

It is difficult to draw any conclusions from these studies. The results are, at times, contradictory.
Maruta et al. (1979) and Roberts and Reinhardt (1980) found no differences between the groups on age, sex, or marital status, while Painter et al. (1980) did. Each of the studies used a different set of comparison variables with different definitions of meaning and different criteria for successful patients were used. No multivariate statistics were used to analyze the data. Lastly, the sample sizes were small.

Comparison of Appropriate Control Groups. The major purpose of a study by Guck (1985) was to evaluate the effectiveness of an interdisciplinary pain program by means of comparison with an appropriate control group in an attempt to tie all these studies together. The study was designed to examine differences on pain program outcome variables reported in the literature between a group of individuals treated for chronic pain at the Pain Management Center on the University of Nebraska Medical Center campus, and a group of individuals evaluated and accepted for treatment, who wanted to participate, but could not because they did not have financial coverage.

The results of a comparison with an appropriate control group provided support for the efficacy of
inpatient, interdisciplinary treatment for chronic pain. This study demonstrated that patients treated in an interdisciplinary pain management center functioned significantly better at follow-up than similar patients who were not treated. Because the no-treatment patients were medically appropriate for the program and were motivated for treatment, the no-treatment control used in Guck's (1985) study was more appropriate than the groups used in two previously cited studies (Roberts & Reinhardt, 1980; Sturgis et al., 1984). Since there were no significant differences between the treatment and no-treatment groups at the time of initial evaluation, it can be assumed that the two groups were equivalent and that the follow-up differences were due to pain center treatment.

The primary goal of interdisciplinary pain centers is to return chronic pain patients to a normal lifestyle free of unnecessary and costly health care system usage. An examination of individual outcome criteria by Guck (1985) corroborated Roberts and Reinhardt's (1980) findings that individuals treated in a pain center return to a more normal, less disabled lifestyle more often than untreated patients.
Significantly more treated patients were employed at follow-up than untreated patients. Treated patients reported less pain-related interference with work, household chores, yard work and shopping, socializing, hobbies and recreational activities, sexual relations, physical exercise, and ability to sleep, than did the no-treatment group (Guck, 1985).

Treated patients also reported more "uptime," lower pain levels, and less depression than untreated patients (Guck, 1985). Results from Guck’s (1985) study also supported Roberts and Reinhardt’s (1980) finding that fewer patients use prescription narcotics and psychotropic medications after treatment, as compared with untreated patients. Control group individuals also reported the same number of pain-related hospitalizations prior to evaluation at the Pain Management Center as after (Guck, 1985).

Results from Guck’s (1985) study suggest that receipt of financial compensation, age, education level, use of psychotropic medications, and the number of pre-treatment pain-related surgeries form a parsimonious set of discriminating variables between successfully and unsuccessfully treated chronic pain
patients at the Pain Management Center. About 70% of the patients were correctly classified as successfully or unsuccessfully treated using Roberts and Reinhardt's criteria. Successfully treated patients were less likely to be receiving compensation, were younger, less likely to be taking psychotropic medications, and had had fewer pre-treatment pain-related surgeries than unsuccessfully treated patients (Guck, 1985).

**Treatment Adherence**

Another way to evaluate the effectiveness of interdisciplinary pain centers would be to assess treatment adherence of patients to their therapeutic regimen. There are few aspects of adherence with health behaviors that can be observed directly. More common in adherence research are indirect measures that are used to infer that the behavior has occurred. In medication adherence, pill counts and prescription renewals have been used (Cluss & Epstein, 1985; Gordis, 1979). In order to control for the possibility of falsification, some researchers have done unannounced pill counts and tried to insure that patients were unaware of the count (Boyd, Covington, Stanaszek, & Coussons, 1974; Haynes et al., 1976; Linkewich,
Others have used pill counts as one measure in combination with other physiological measures.

The consequences of nonadherence with prescribed treatment may be serious, including exacerbation and progression of the disability, development of secondary complications, more frequent medical emergencies, unnecessary prescriptions for more potent and potentially more toxic drugs or dosages, and, in general, failure of treatment. Unless adherence to the recommended self-care recommendations is measured, it is impossible to determine whether the ineffectiveness is due to the treatment itself or because it is not being carried out as instructed (Marlatt & Gordon, 1985).

Patient nonadherence with therapeutic regimens is a well-documented health problem and also a prolific area of research (Meichenbaum & Turk, 1987). The extent of the problem is demonstrated by considering that even with simple medication regimens such as taking prescribed medication, approximately 1/3 of patients can be expected to be nonadherent. Regimens that are more demanding of patients, can, therefore, be
expected to have even lower adherence rates. Assuming that 100% of the patients who leave a treatment program are committed to adopting the prescribed practices, there is a characteristic drop of 40-80% in actual maintenance of these behaviors during the first six weeks (Marlatt & Gordon, 1985).

If treatment is shown to be effective, without assessing adherence, it is not possible to discern whether the active ingredient was contained in the treatment or other non-specific treatment factors. For example, those who are adherent may be different in many of their behaviors compared to those who are nonadherent.

More adherent individuals may differ on important variables that contribute to successful outcomes besides the presumed active ingredients of treatment. For example, those patients who practice relaxation may have more faith in the treatment or their ability to control pain (i.e. an internal locus of control). The belief in control rather than the actual physical changes produced by the relaxation may be the active ingredient leading to treatment efficacy (Hijzen,
Chronic Pain Patients’ Adherence. Patients with chronic pain frequently get discouraged with extended medical treatments that produce limited therapeutic results, and consequently, some become less adherent over time. It has been estimated that at least 50% of patients with rheumatoid arthritis are nonadherent with therapy irrespective of the nature of the intervention (Balcon, Haynes, & Tugwell, 1984). Holroyd et al. (1988) reported that 70% prescribed abortive medication for migraine headaches, even with explicit instructions from the prescribing physicians, did not make optimal use of the medication. For many patients there is not a one-to-one correspondence between regular performance of recommended self-care programs and symptoms.

In many cases, investigators are not sure what are the necessary and sufficient set of self-care behaviors required to produce clinical benefit. People who exercise regularly may still have pain, and some patients who discontinue exercise may be pain-free for days or longer. A chronic pain patient may think "if exercise makes little difference, why continue or why
not modify the frequency and nature of the exercises? How do I know if I need to continue the exercise if it is not occasionally stopped? How do I know if my pain is reduced and that it is because of the exercise versus spontaneous remission of the disorder? Is the "meaning" of the exercise in my everyday life more important than nonadherence with health care providers' specific orders and medical regimens?"

These and related questions contribute to the degree of intentional nonadherence and can be contrasted with unintentional nonadherence, evidenced by memory problems, lack of understanding of required behaviors, and inadequate instructions by health care providers.

Influences upon Treatment Adherence. Painter et al. (1980) examined four classes of variables that might be related to relapse and nonadherence, among them attitude variables. They included 25 pain treatment successes and 25 pain treatment failures in their analysis and concluded that the failure group demonstrated less incentive for maintaining their gains, most of whom continued to receive financial compensation for their pain. Differences in attitudes
were also identified, with the failure group more likely to assume a dependent, passive stance; in other words, an external orientation wherein the individual has little control over what occurs and attributes events to luck or chance.

The work of Becker et al. (1977) suggests that personal beliefs about illness can greatly diminish adherence if there is discordance with the treatment offered. In light of Becker and Maiman's (1975) work on beliefs and adherence, it seems likely that pain beliefs would similarly mediate adherence with chronic pain treatment and rehabilitation.

Williams and Thorn (1989) developed a pain beliefs and perceptions questionnaire that was comprised of three factors: pain stability, pain as a mystery, and self-blame. They found that adherence during treatment was associated with specific pain beliefs. Beliefs in the long duration of pain and the perception of pain as a mystery was associated with lower adherence with physical and psychological modalities such as relaxation. Physical exercise adherence was diminished by a strongly held belief in the "mysterious" nature of pain. It appears that patients who lack a framework
for understanding their pain may view the sore muscles resulting from some physical therapy treatments as time ill-spent or even counterproductive because of their "understanding" of the cue-function of pain.

Assessment of Adherence. One reasonable way to understand adherence is to adopt the criterion proposed by Gordis (1976): "the point below which the desired preventive or desired therapeutic result is unlikely to be achieved." Silver, Blanchard, Williamson, Theobold, and Brown (1979) found that post-therapy improvement was maintained by some patients who improved who had reported that they continued to practice relaxation at least weekly. Note, however, that the instructions were to practice daily. The use of a yes/no response would suggest that they were not adherent. However, as noted above, adherence generally cannot be considered all-or-none and should be measured on a continuum.

The most easily obtained and most frequently used measure to assess adherence is asking patients directly whether they have taken their medication or asking them to report the frequency, duration, and number of specific behaviors performed (e.g. relaxation exercises). Patients' subjective reports have been
challenged because they are often inaccurate and are likely to be biased in a socially desirable direction. Despite limitations, self-report has the important advantage of being the easiest to implement and it may enhance adherence by encouraging discussion of adherence difficulties between the health care provider and the patient. Moreover, there is no convenient or acceptable way to objectively validate adherence with regards to some therapeutic recommendations, for example, cognitive reinterpretation or distraction.

Lake, Rainey, and Papsdorf (1979) examined biofeedback combined with rational-emotive psychotherapy for migraine sufferers. They were able to obtain follow-up data from 24 patients three months after treatment and reported that home practice was unrelated to improvement, as measured by daily activity records. However, both the frequency and duration of home practice during the three-month follow-up were related to retrospective estimates of improvement. Subjects who indicated that they practiced the procedure more frequently and for longer periods of time estimated more improvement in headache activity. However, examinations of correlations between amount of
practice and improvement does not permit determination of any causal relationship.

Blanchard (1987) reviewed ten prospective follow-up studies of headaches of at least one year in duration and concluded that: (a) tension headache relief from cognitive therapy or relaxation is maintained for two to four years, while the frontalis EMG biofeedback alone deteriorates progressively (but not back to pre-treatment levels) at two and three years; (b) for migraine headaches, there is good maintenance of headache reduction at one year; and (c) for vascular headaches (migraine and combined migraine and tension) treated with relaxation and thermal biofeedback, there is tentative support for a persistent, progressive deterioration year-by-year, at least up to four years.

Keeping appointments is a basic measure of adherence to treatment regimens. With many kinds of diseases and conditions, regular appointments are recommended. These appointments may be with the physician or nurse practitioner, or they may be for blood work, or other laboratory tests or they may be
auxiliary appointments with dieticians, physical therapists, or other allied health professionals.

Adherence to keeping these appointments may be an indicator of the extent to which the patient is following doctor's orders. In addition, the facility itself may be interested in appointment keeping as part of an overall evaluation of their success in health care delivery. Every service has a usual "break rate," which is the number of appointments that are cancelled, rescheduled, or simply not kept. Some services may want to keep track of their break rate while they experiment with different forms of call backs or change other aspects of their procedures.

In one of the few studies that was directly designed to examine adherence following treatment of chronic pain in an interdisciplinary setting, Lutz, Silbret, and Olshan (1983) documented the magnitude of the problem. Lutz et al. (1983) asked patients how often they used certain procedures in a typical week. Specifically, ratings were made on: (a) progressive ambulation exercises, such as an exercise bicycle or extended walks; (b) physical and occupational therapy exercises, such as stretching and strengthening
exercises and neck and shoulder rotations; (c) home treatments, such as ice and hot packs, massage, or electrical stimulation; (d) relaxation and/or self-hypnosis; and (e) use of proper body mechanics when standing, lifting, bending, and reaching.

Response choices included less than once per week or not at all, 1-2 times/week, 3-4 times/week, 5-6 times/week, daily, and one or more times/day. Choices for use of proper body mechanics included: (a) never or almost never; (b) occasionally, but less than 25% of the time; (c) between 25% and 50% of the time; (d) between 50% and 75% of the time; and (e) more than 75% of the time.

Based on patients' self-report, the overall adherence rate for eight months or less following treatment termination was only 12.3%. Adherence with separate prescribed behaviors averaged about 42%, and adherence with any one prescribed behavior was unrelated to the probability of adhering with other behaviors.

Martin et al. (1984) found that self-setting of realistic goals, the use of positive self-talk, and concentration on pleasant environmental stimuli during
exercise were more effective in increasing adherence than setting high performance standards and focusing on bodily sensations. These seem to be behaviors that are more prevalent in an internal's frame of reference because they require taking more personal responsibility for the performance of specific behaviors.

**Statement of Hypotheses**

Much of the previous discussion about control, mastery, pain, efficacy of pain management centers, and treatment adherence would lead one to expect that the reactions of internals are generally more constructive. That is, the greater disposition to action of internals seems to equip them in a variety of ways for superior coping and pain management over the long term. Based on the research that indicates that internals take more responsibility in an attempt to control their environment and that treatment adherence is an issue that merits more evaluation, the following hypotheses will be investigated:

(1) There will be a significant positive correlation between those classified as High Internals on the PLOCI and treatment adherence as
measured by (a) the actual number of times per week any strategy is used; (b) the ideal number of times per week the strategies are used; and (c) the importance (value) of the strategies.

(2) Those classified as High Internals on the PLOCI will show greater decrease in level of pain between pre- and follow-up test as compared to those classified as Low Internals.

(3) Those classified as High Internals on the PLOCI will show greater decrease in level of pain interference between pre- and follow-up test as compared to those classified as Low Internals.
Chapter III—Methodology

Subjects

The population from which subjects were drawn for this study were adults who had completed the four-week, five-day-a-week Pain Program at the Pain Management Center on the University of Nebraska Medical Center campus between 1980 and 1989. Seventy-nine out of 467 patients returned questionnaire packets, 29 males and 50 females, producing a 17% response rate. Ages ranged from 26 to 74, with an average age of 52.

Since this research was concerned with aspects of pain locus of control and treatment adherence, it was logical to have the subjects be patients who had received training and completed a pain management program. Subjects were selected on the basis of two criteria: completion of the four-week pain program and willingness to participate in this study as demonstrated by return of the data contained in the mailing to the Pain Management Center.

Program Description

The Pain Management Center is a self-contained, outpatient program at the University of Nebraska Medical Center, medically staffed by a neurosurgeon and
an anesthesiologist. Day-to-day services are administered by two clinical psychologists, two physical therapists, and two full-time nurses.

Prospective patients are referred to the Pain Center by their physician, attorney, rehabilitation worker, or insurance carrier. Patients are evaluated by the interdisciplinary pain team to determine eligibility for the program.

Eligibility is determined with the following criteria: (a) pain has to be of a chronic benign nature, that is, it is not the result of an active disease process; (b) other medical or psychiatric treatments were not appropriate; (c) the pain has been present for at least six months; (d) the patient indicates that he/she wants to participate in the program; and (e) the patient agrees to involve a family member or significant other person in the treatment.

Eligible patients are admitted for a four-week program with weekends off. The primary purpose of the program is to help patients cope more effectively with pain-related problems. There is a gradual reduction and eventual elimination of all non-narcotic, narcotic, and psychotropicanal pain medication. There is a
progressively increasing program of daily exercise and physical activity. Individual exercises (stair climbing, walking, stationary bicycle riding, and free time activities) are graphed. There is an attempt to identify and resolve psychosocial issues related to or caused by the pain situation. Treatment modalities used to carry this out include group discussions and lectures, individual counseling and psychotherapy, meetings with family members, relaxation training and biofeedback, vocational counseling, and work simulation if feasible.

**Instruments**

**PLOC.** The instruments used in this study were the Pain Locus of Control Scale (PLOC) developed by Toomey, Lundeen, Mann, & Abashian (1988), a Visual Analogue Scale measuring level of pain, a pain interference rating which assesses the degree to which pain interferes in a subject’s daily activities, and a Scale of Value and Usefulness (SOVU) developed by the principal investigator. The PLOC scale is a multidimensional scale with three subscales. As such, it has questions that correspond to each subscale. Each subscale, when forms A and B are combined as they
were for this study, has 12 questions that form its subscale, with the highest possible score being 60. The PLOCI (Internal) is scored by summing questions 1, 6, 8, 12, 13, 17, 19, 24, 26, 30, 31, and 35. The PLOCPO (Powerful Others) is scored by summing questions 2, 4, 9, 11, 15, 16, 20, 22, 27, 33, and 34. The PLOCC (Chance) is scored by summing questions 3, 5, 7, 10, 14, 18, 21, 23, 25, 28, 32, and 36.

The PLOC uses a Likert scale which asks to what extent the subject agrees or disagrees with a statement. Alpha reliabilities for the PLOC Internal, Powerful Others, and Chance Subscales (alphas= .81, .80, and .79 respectively for Form A) approximate the reported reliabilities of the MHLC.

Split-half reliabilities (Spearman-Brown formula) have revealed that responses on Form A and Form B subscales are highly consistent (.89 for Internal, Powerful Others and Chance). Additional information on the reliability and validity of the PLOC was provided in the literature review section.

VAS. An absolute Visual Analogue Scale (VAS) is a 100 mm straight line with its ends defined as the extreme limits of the sensation, in this case, level of
pain, to be measured. Four VAS's labeled a "Good Day," a "Bad Day," "Average This Month," and "Today," with "Pain at Its Worst," at the top and "No Pain," at the bottom were used in this study. Patients placed an X on the line that represented their level of pain. Patients have used the VAS as part of their assessment process at the Center before admission (i.e. pre-treatment). In an attempt to gain pre- and post-treatment measures, the same scale was used as part of the follow-up questionnaire to maintain consistency, provide an equivalent measure of the same person at pre- and post-treatment times, and allow a comparison between pre- and post-treatment levels of pain.

The advantage of this scale was its sensitivity. The lack of sensitivity of a simple descriptive scale has been demonstrated by Huskisson, Shenfield, Taylor, and Hart (1970) in that the mean change produced in a group of patients by anti-inflammatory drugs and placebo took place entirely within one grade of the scale. A VAS versus a simple descriptive pain scale in a group of penicillamine patients demonstrated the greater sensitivity of the VAS.
The aim of a study by Carlsson (1983) was to reexamine the VAS with respect particularly to reliability and validity. Changes of pain intensity were assessed by absolute (two descriptors only) and comparative (multiple verbal comparisons) forms of the VAS. The mean correlation between the two types of scales was low when the pain was indicated as decreasing, as compared to unchanged or increasing pain. Carlsson (1983) concluded that for the estimation of chronic pain an absolute VAS seems to be preferable to a comparative one, because the comparative scale seems to be more influenced by effects of expectancy and deficient memory of pain.

Level of pain was the average score of all four 100 mm visual analogue scales for each patient. VAS scores were computed at pre-treatment and at follow-up. These scores were used to test for pre-post changes.

**INTF.** An interference rating scale assessed the degree to which patients’ perceived pain interfered in the following daily activities: going to work, performing household chores, yard work or shopping, socializing with friends, recreation and hobbies, having sexual relations, doing physical exercise, and
sleep. Sleep was an activity that was added to the scale in 1988, so patients seen before that time did not have sleep as an activity to rate. Ratings were 1=not at all, 2=a little bit, 3=moderately, 4=quite a bit, and 5=extremely. This scale has been used in dissertation research by Guck (1985). A Cronbach Alpha run on this measure with 81 subjects was .87 (Guck, 1991).

Interference scale scores were summed across all activities for each patient and divided by the number of activities (either 7 or 8) to yield an average score. INTF scores were obtained at pre-treatment and at follow-up and, again, used to test for pre-post changes.

SOVU. Self-report provides the most direct assessment of affect and cognition. This instrument (SOVU) posited the techniques that patients learned at the Pain Management Center. If that particular technique was recommended for their particular treatment program, subjects were asked to circle a "Y" for Yes, an "N" for No. This made it easier to discern between a subject who was encouraged to use a technique versus a subject who did not answer the question. The
SOVU asked subjects to fill in the number of times per week they used each technique and the number of times they WISHED (i.e. the ideal) they used the technique per week. This instrument also asked subjects to rate the technique in terms of how important they perceived the technique was in managing their pain: 1=not at all important, 2=somewhat important, 3=moderately important, 4=quite important, and 5=extremely important. All scales, together with some basic demographic data (age, sex, and ethnic origin) required no more than 15-20 minutes of the subjects' time to complete.

An actual use score was computed by summing the actual-number-of-times-used values for all strategies together and dividing that sum by the number of strategies not equal to zero. Ideal use scores and importance scores were computed in the same manner for each set of scores, respectively.

Procedure

Prior to the mailing of the SOVU described above, ten patients who were currently participating in the Pain Program served as "pilot" subjects to evaluate the clarity of the scale developed by the principal
investigator. Changes were made until clarity was achieved. As soon as it was determined that the instrument had sufficient clarity, mailings began.

In addition to the instruments described above, the packets mailed to the subjects contained a cover letter from the director of the Pain Management Center and the principal investigator explaining the purpose and the importance of the study, along with a request for participation. Informed consent was assumed as witnessed by the return of the materials by the subject. Subjects were asked to return the materials via the enclosed business reply envelope to the Pain Management Center within seven days.

Upon return of data, identification numbers were assigned to each subject. All data was then entered in for analysis and discussed in terms of those numbers and not by the names of the subjects.

Method of Analysis

The means and standard deviations were calculated for the PLOC, VAS, Level of Interference Scale, and the SOVU and are presented in Table 4.1. On the SOVU, the means and standard deviations were calculated by taking the total number of times per week DIVIDED by the total
number of strategies REPORTED as being used by all subjects. The same procedure was followed for the means and standard deviations of the ideal number of times per week and the importance ratings. This was done in an effort to avoid penalizing those patients who did not have a particular activity recommended to them as part of their treatment protocol.

Hypothesis one was evaluated by determining the intercorrelations between the PLOCI and the actual number of times per week any strategy was used, the ideal number of times per week the strategies were used, and the importance (value) of the strategies. Hypotheses two and three were analyzed using a one between (internal versus external) and one within (pre- and follow-up-test) analysis of variance. Scores on the visual analogue scale were used for hypothesis two and pain interference scores for hypothesis three.

An exploratory regression analysis was run to determine the relationship of age, gender, time since treatment began, and the PLOC subscales as predictors of level of pain as measured by the VAS. A second exploratory regression analysis was run to determine the relationship of age, gender, time since treatment
began, and PLOC subscales as predictors of level of pain interference.
Chapter IV--Results

Relationship between PLOCI and Treatment Adherence

All subscales (I, PO, and C) had a possible score of 60. Scores on the Internal subscale of the PLOC (PLOCI) ranged from 15 to 56. Scores on the Powerful Others subscale of the PLOC (PLOCPO) ranged from 15 to 47 and those on Chance (PLOCC) ranged from 12 to 48. The medians, which were used to classify subjects into I, PO, and C pain locus of control orientations, were 41, 26, and 21, respectively.

The means and standard deviations for all measures used in this study are presented in Table 4.1.
Table 4.1
Means and Standard Deviations of the Measures Used

<table>
<thead>
<tr>
<th>MEASURES</th>
<th>MEANS</th>
<th>ST. DEVIATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLOC:</td>
<td>PLOCI</td>
<td>40.430</td>
</tr>
<tr>
<td></td>
<td>PLOCP</td>
<td>26.934</td>
</tr>
<tr>
<td></td>
<td>PLOCC</td>
<td>22.360</td>
</tr>
<tr>
<td>PLOCPO</td>
<td></td>
<td>7.750</td>
</tr>
<tr>
<td>PLOCC</td>
<td></td>
<td>8.062</td>
</tr>
<tr>
<td>PVAS:</td>
<td>PGOOD</td>
<td>51.829</td>
</tr>
<tr>
<td></td>
<td>PBAD</td>
<td>89.918</td>
</tr>
<tr>
<td></td>
<td>PAVER</td>
<td>77.350</td>
</tr>
<tr>
<td></td>
<td>PTODAY</td>
<td>72.164</td>
</tr>
<tr>
<td></td>
<td>PVASTOT</td>
<td>72.082</td>
</tr>
<tr>
<td>INTF:</td>
<td>PINTFTOT</td>
<td>3.985</td>
</tr>
<tr>
<td>SOVU:</td>
<td>AVERB</td>
<td>5.166</td>
</tr>
<tr>
<td></td>
<td>AVERC</td>
<td>5.964</td>
</tr>
<tr>
<td></td>
<td>IMPTOT</td>
<td>3.493</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.820</td>
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<td></td>
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<td>2.926</td>
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<tr>
<td></td>
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<td>1.194</td>
</tr>
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<td></td>
<td></td>
<td>2.863</td>
</tr>
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<td>3.070</td>
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<tr>
<td></td>
<td></td>
<td>.921</td>
</tr>
</tbody>
</table>
The correlation matrix of the PLOC subscales and treatment adherence as measured by the SOVU are presented in Table 4.2. Results indicated a low negative correlation ($r=-.2783$) between the I subscale and PO subscale on the PLOC at the $p=.05$ level. PLOCI did not significantly correlate with the Chance (C) subscale, the actual number of times per week (AVERB), the ideal number of times per week (AVERC), or the importance ratings (IMPTOT).

There was a moderately positive correlation ($r=.3982$) between the PO and C subscales at the $p=.01$ level. The PO subscale did not significantly correlate with AVERB, AVERC, or IMPTOT.

There was a highly positive correlation ($r=.8967$) between AVERB and AVERC, a moderately positive correlation ($r=.3430$) between AVERB and IMPTOT, and a low to moderate positive correlation ($r=.3403$) between AVERC and IMPTOT, all at the $p=.01$ level.

Hypothesis one was NOT supported since there were no significant correlations between the PLOCI and the actual number of times per week ($r=-.0468$), the ideal number of times per week ($r=-.0505$) and the importance ratings ($r=.2125$).
Table 4.2
Correlation Matrix of the PLOC Subscales and the SÖVU

<table>
<thead>
<tr>
<th></th>
<th>PLOCI</th>
<th>PLCPO</th>
<th>PLOCC</th>
<th>AVERB</th>
<th>AVERC</th>
<th>IPTOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLOCI</td>
<td>1.0000</td>
<td>-.2783</td>
<td>.0287</td>
<td>-.0468</td>
<td>-.0505</td>
<td>.2125</td>
</tr>
<tr>
<td>PLCPO</td>
<td>1.0000</td>
<td>1.0000</td>
<td>.3982</td>
<td>.1675</td>
<td>.1435</td>
<td>.1219</td>
</tr>
<tr>
<td>PLOCC</td>
<td>1.0000</td>
<td>1.0000</td>
<td>1.0000</td>
<td>-.1352</td>
<td>-.1086</td>
<td>.0066</td>
</tr>
<tr>
<td>AVERB</td>
<td>1.0000</td>
<td>1.0000</td>
<td>1.0000</td>
<td>.8967</td>
<td>.3430</td>
<td></td>
</tr>
<tr>
<td>AVERC</td>
<td></td>
<td></td>
<td></td>
<td>1.0000</td>
<td>.3403</td>
<td></td>
</tr>
<tr>
<td>IPTOT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.0000</td>
</tr>
</tbody>
</table>

Comparison of High v. Low PLOC and Treatment Outcome

For all analyses of variance, $t_{crit}(1, 40) = 1.684$ at the $p=.05$ level. Degrees of freedom of 1 and 40 were used for all these comparisons instead of interpolating degrees of freedom from 40 to 60.

Pain Level. No significant interaction was found between High-Low PLOC and pre-post VAS. Although no significant interaction was present between High and Low Internals on the PLOC and the pre-post VAS, an analysis of the means revealed a bigger drop in scores for the High I's than the Low I's. Using an a priori comparison, significant pre-post differences on the VAS were found for the High I's ($t(1, 43) = 6.78$) and the Low I's ($t(1, 43) = 3.48$), with the High I group having
greater pre-post decrease in pain level than the Low I group (See Table 4.3). Given the a priori comparisons, the present study provided support for hypothesis two.

There was a significant difference between High and Low Internals on the VAS measured at the time of follow-up, \( F(1, 41) = 9.38, p<.005 \), with the High I group reporting less pain than the Low I group. However, no significant differences were found between High and Low I’s at pre-treatment on the VAS. A significant difference was also found on the VAS from pre- to post-treatment, \( F(1, 41) = 26.18, p<.001 \), with post-treatment pain level significantly lower than at pre-treatment.

Although not part of the formal hypothesis number two, results indicated a significant interaction between High and Low Powerful Others on the PLOCPO and pre-post VAS, \( F(1, 40) = 11.85, p<.05 \). An analysis of the means revealed significant pre-post differences on the VAS for the Low PO’s (\( t(1, 40) = 8.896 \)) and the High PO’s (\( t(1, 40) = 2.00 \)), with the Low PO’s having greater pre-post decrease in pain level than the High PO group (See Table 4.3).
There was a significant difference between the High and Low PO’s on the VAS measured at the time of follow-up, $F(1, 40) = 18.50, p < .001$, with the Low PO’s reporting less pain than the High PO group. No significant differences were found between the High and Low PO’s at pre-treatment on the VAS. A significant difference was also found from pre- to post-treatment on the VAS, $F(1, 40) = 29.64, p < .001$, again with the post-treatment pain level significantly lower than that at pre-treatment.

There was no significant interaction between High and Low Chance scorers on the PLOCC and the VAS. Both decreased their scores between pre- and post-tests (See Table 4.3). There was no significant difference between High and Low C’s on the VAS measured at the time of follow-up. No significant differences were found between High and Low C’s at pre-treatment on the VAS. However, there was a significant difference between pre- and post-treatment on the VAS, $F(1, 39) = 22.31, p < .001$, with post-treatment pain level significantly lower than at pre-treatment.

**Pain Interference.** There was a significant interaction between High-Low PLOCI and pre-post INTF,
$F(1, 43) = 3.45, \ p<.05$. An analysis of means showed that there was a bigger drop in scores for the High I's than the Low I's. Using an a priori comparison, significant pre-post differences on the INTF were found for the High I's ($t(1, 43) = 8.106$) and the Low I's ($t(1, 43) = 3.47$) (See Table 4.4), with the High I group reporting less pain interference than the Low I group. Hypothesis three was supported.

There was a significant difference between High and Low Internals on the INTF measured at the time of follow-up, $F(1, 43) = 12.79, \ p<.001$, with the High I group reporting less pain interference than the Low I group. No significant differences were found between High and Low I's at pre-treatment on the INTF. A significant difference was also found on the INTF from pre- to post-treatment, $F(1, 43) = 21.52, \ p<.001$, with the post-treatment pain interference level significantly lower than at pre-treatment.

Although not part of the formal hypothesis three, results indicated a significant interaction between High and Low Powerful Others on the PLOCPO and pre-post INTF, $F(1, 41) = 7.77, \ p<.05$. An analysis of the means revealed significant pre-post differences on the INTF.
for the Low PO’s ($t(1, 41) = 8.450$) and the High PO’s ($t(1, 41) = 2.83$), with the Low PO’s having greater pre-post decrease in pain interference level than the High PO group (See Table 4.4).

There was a significant difference between the High and Low PO’s on the INTF measured at the time of follow-up, $F(1, 41) = 12.47, p<.001$, with the Low PO’s reporting less pain interference than the High PO group. No significant differences were found between High and Low PO’s at pre-treatment on the INTF. A significant difference was also found on the INTF from pre- to post-treatment, $F(1, 41) = 31.34, p<.001$, with post-treatment pain interference level significantly lower than at pre-treatment.

There was no significant interaction between High and Low Chance scorers on the PLOCC and the INTF. Both decreased their scores between pre- and post-tests (See Table 4.4). There was no significant difference between the High and Low C’s on the INTF measured at the time of follow-up. No significant differences were found between High and Low C’s at pre-treatment on the INTF. However, there was a significant difference between pre- and post-treatment in the INTF, $F(1, 41) =$
24.59, \( p < .001 \), with post-treatment pain interference level significantly lower than at pre-treatment.

**Exploratory Analyses**

**Pain Level.** The first predictor of the level of pain, chosen by stepwise regression analysis, was the Powerful Others subscale of the PLOC (PLOCPO). The second predictor of it was age. The other predictors of gender, time since treatment began, PLOCI, and PLOCC did not load into the equation. The analysis of variance yielded an \( F(2, 68) = 13.705, p < .0001 \). The R square value was .28729 and the Beta Coefficients were .512753 for the PLOCPO and .207646 for age. The regression coefficient (B) for the PLOCPO was 1.755342 and for age was .548387. The other factors did not load into the equation, meaning they did not add any unique significant additional variance.

Since the Beta and regression coefficients were significant and positive, this exploratory regression analysis revealed that as the score on the Powerful Others subscale increases and as age increases, the total score on the level of pain scale (VAS) increases.

**Pain Interference.** The best and only predictor of the level of pain interference, chosen by stepwise
regression analysis, was the PLOCPO. Age, gender, time since treatment began, PLOCI, and PLOCC did not load into the equation. The analysis of variance gave an $F(1, 71) = 33.32115$, $p<.0001$ with an $R$ square value of .31941 and a Beta Coefficient of .565163. The regression coefficient was .087065. The other factors did not load into the equation, again, not adding any unique significant additional variance.

Since the Beta and regression coefficients were significant and positive, this exploratory regression analysis revealed that as the score on the Powerful Others subscale increases, so does the total score on the Interference Scale (INTF).
Table 4.3
Means of the Pre- and Post-Vas for the PLOC subscales

<table>
<thead>
<tr>
<th></th>
<th>PVASTOT</th>
<th>VASTOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLOCI:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low I:</td>
<td>76.717</td>
<td>62.989</td>
</tr>
<tr>
<td>High I:</td>
<td>68.950</td>
<td>42.250</td>
</tr>
<tr>
<td>Total:</td>
<td>73.105</td>
<td>53.343</td>
</tr>
<tr>
<td>PLOCPO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low PO:</td>
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<td>High PO:</td>
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<td>72.685</td>
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</tr>
<tr>
<td>PLOCC:</td>
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<td></td>
</tr>
<tr>
<td>Low C:</td>
<td>74.386</td>
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<tr>
<td>High C:</td>
<td>71.855</td>
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</tr>
<tr>
<td>Total:</td>
<td>73.213</td>
<td>53.652</td>
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Table 4.4
Means of the Pre- and Post-INTF for the PLOC subscales

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<th>PINTFTOT</th>
<th>INTFTOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLOCI:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low I:</td>
<td>4.065</td>
<td>3.475</td>
</tr>
<tr>
<td>High I:</td>
<td>3.653</td>
<td>2.275</td>
</tr>
<tr>
<td>Total:</td>
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</tr>
<tr>
<td>PLOCPO:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low PO:</td>
<td>3.675</td>
<td>2.231</td>
</tr>
<tr>
<td>High PO:</td>
<td>4.011</td>
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<td>Total:</td>
<td>3.855</td>
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<tr>
<td>PLOCC:</td>
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<tr>
<td>Low C:</td>
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<td>High C:</td>
<td>3.674</td>
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<tr>
<td>Total:</td>
<td>3.874</td>
<td>2.942</td>
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</table>
Chapter V--Discussion

**Relationship Between PLOC and Treatment Adherence**

Hypothesis one was not supported since there were no significant correlations between the Internal subscale (PLOCI) and the adherence measures of the actual number of times per week, the ideal number of times per week, and the importance ratings.

Several factors may have contributed to the present results of no significant relationships between PLOCI and measures of adherence. One reason may be that, conceptually, no significant relationship exists between these variables. While this conclusion is possible, this author speculates that several other factors may have contributed to this study’s results. Discussion of these factors will follow as they relate, first, to the PLOC variable, and then to the measures of adherence.

One factor concerning the PLOCI is its relationships to the two external pain locus of control orientations (PLOCPO and PLOCC). In the present study, a significant negative relationship was found between PLOCI and PLOCPO ($r = -.278, p<.05$), with no significant correlation between PLOCI and PLOCC.
Schaefer (1989) found a similar significant correlation between PLOCI and PLOCPO ($r = -.250, p<.05$), but unlike the present study, found a significant negative correlation between PLOCI and PLOCC ($r = -.670, p<.05$). Penzien et al. (1989), in contrast to the present study and Schaefer (1989), found a significant positive relationship between PLOCI and PLOCPO ($r = .20, p<05$), while, like the present study, but in contrast to Schaefer (1989), reported no significant relationship between PLOCI and PLOCC. The above correlations are presented in Table 5.1.

Table 5.1

Correlations of PLOC Subscales across Studies

<table>
<thead>
<tr>
<th></th>
<th>WALL</th>
<th>SCHAEFER</th>
<th>PENZIEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLOCI &amp; C</td>
<td>.028</td>
<td>-.670</td>
<td>-.080</td>
</tr>
<tr>
<td>PLOCI &amp; PO</td>
<td>-.278</td>
<td>-.250</td>
<td>.200</td>
</tr>
</tbody>
</table>

As the table shows, the present study and Schaefer (1989) found significant negative correlations between PLOCI and PLOCPO, whereas Penzien et al. (1989) found a positive relationship between the two subscales. While
no pre-treatment measure was obtained, the differences in the PLOC orientations may provide evidence that a PLOC orientation is a modifiable, as opposed to a stable, trait.

The present study and Penzien et al. (1989) differ from Schaefer's (1989) work in that there was no significant relationship between PLOCI and PLOCC in this study at post-treatment and in Penzien et al. (1989) at pre-treatment. Schaefer (1989) found a significant negative correlation between PLOCI and PLOCC at post-treatment. Despite the pre-post differences of these three comparison studies, these differences may indicate that PLOCI is not "pure;" for example, the Low I group and the High PO group may include many of the same patients. A cluster analysis of the PLOC, as suggested by Wallston and Wallston (1981) for the MHLC, may truly define Internal, Powerful Others and Chance scorers into High and Low groups. However, it is probable that individuals can never be divided into strict categories that apply to all situations and events.

In using the PLOC, it is important to keep in mind the theoretical and empirical underpinnings of the pain
locus of control. As a health-specific indicator of generalized expectancy of locus of control of reinforcements, based on Rotter et al.'s (1972) social learning theory, it is possible the relationship between PLOCI and adherence is affected by other factors such as age, gender, and type and severity of pain. An examination of one or more of a multitude of contributing factors that may affect the relationship between PLOCI and treatment adherence appears warranted.

Several factors regarding the adherence measures may also account for the lack of support of hypothesis one. As discussed in Turk and Rudy (1991), adherence scores were estimated from patients who entered treatment and who were available and willing to respond to follow-up self-report questionnaires. Patients who responded to the questionnaires may be higher on social desirability and, as such, may also have had this same bias on the adherence measures. In addition, adherence scores were based on patients' recollection of intervention strategies.

There was a relatively low return rate (17%). This rate was greatly influenced by the duration of the
follow-up period, which was anywhere from two to twelve years. The shorter time since treatment usually led to a higher number of patients responding to the follow-up questionnaire. A global return rate has been reported here even though the time since treatment varied considerably among the patients studied.

Results based on different times of follow-up can be difficult to interpret because memory research has repeatedly demonstrated that significant recall distortions occur over time (Ross, 1989). Additionally, patients may revise their estimates of prior pain based on current levels. Thus, current pain level may serve as an anchor for recall of previous pain. In this way, patients may overestimate their improvement and adherence because of how "bad off" they recall they were prior to treatment (Ross, 1989). Recall of medication use and activity levels also are biased by memory effects and are usually underestimated (Turk & Rudy, 1991).

Turk and Rudy (1991) also note that many pain treatment programs are conducted in tightly structured, hospital environments and are of a relatively brief duration (3-8 weeks). Thus, can one realistically
expect long-term changes from short-term treatment in controlled environments? Why should one expect that what is learned by patients in a brief, regimented environment will generalize to and be maintained when patients, many with long histories of pain, leave the shelter of the therapeutic environment of the clinic, and return home?

Expectations for pain clinics to succeed with patients having longstanding histories of inactivity, deconditioning, feelings of helplessness and hopelessness, a lifetime history of dependence on the health-care system, and so on, may be too high. Patient regression to preadmission levels might be attributable to insufficient generalization or translation into the patient's home environment of the skills and treatments learned and performed while actively participating in pain clinics (Dolce et al., 1986; Philips, 1987).

Since there is a highly positive correlation between the actual number of times per week and the ideal number of times per week ($r=.8967, p<.05$) and a moderately positive correlation between the actual number of times per week and the importance ratings
(r=.3430, \( p < .01 \)), it is possible to surmise that most subjects felt that their actual number of activities matched their ideal (target) number of activities closely, and, therefore, they felt the specific activities were highly important to them. If a patient is actually performing a certain activity day after day, it seems likely he/she would deem it an important way to spend his/her time and would, therefore, perceive the actual activity and its performance as important, regardless of whether or not he/she possessed an internal orientation as measured by the PLOC.

Another possible explanation for no significant relationships between PLOCI and measures of adherence was the reliability of the adherence measure. The literature is very sparse with regards to construction of adherence measures directly related to pain and construction of such measures is a lengthy process, far beyond the scope of this study. Since there are no standard pain adherence measures, the principal investigator simply took an educated best guess by constructing the SOVU. Due to the nature of pain and the results of this study, a more reliable and valid
measure may have produced different results. The Limitations section has a more thorough discussion of the SOVU's reliability.

Thus, failure to find support for hypothesis one could be due to the following issues: (a) empirically, there may not be a relationship between PLOCI and treatment adherence; (b) "pure" internals may not be identified unless a cluster analysis is used; (c) the time of use of the PLOC (either pre- or post-treatment) may influence orientation changes; and (d) methodological problems such as small and unrepresentative respondents coupled with reliance upon biased recall and lack of the reliability of the SOVU.

Comparison of High v. Low PLOC and Treatment Outcome

Pain Level. Results of the present study provided support for hypothesis two in that the High I's decreased their level of pain more than did the Low I's. This supported Toomey et al. (1991) in that High I's reported less intense pain than Low I's. However, Toomey et al.'s (1991) results were taken on the VAS at pre-treatment only. Results of the present study found no difference between High and Low I's at pre-treatment on the VAS. The differences may be due to the
different sample used by Toomey et al. (1991). Toomey et al. (1991) may have used a wide, less homogeneous sample, whereas the present study used a homogeneous sample that met the criterion for the Pain Management Center.

Although training in self-control management strategies is a regular component of most pain treatment programs, the present data suggest that patients vary considerably in perceived ability to control pain. Toomey et al. (1991) suggest that administration of the PLOC might allow more precise selection of patients for specific interventions.

Toomey et al.'s (1991) study included a VAS with separate ratings of good, bad, and average, and thus, allowed consideration of the contribution of the relative intensity of pain to the ability to control pain. The present study used an even more expanded version of the VAS (with four categories) and still was consistent with Toomey et al.'s (1991) results: High I's decreased their level of pain. The present study provided greater support since it had a pre-VAS, allowing differences to be calculated for pre- and post-treatment, not just post. This study's findings
were consistent with those of Aronoff et al. (1983), Chapman et al. (1981), and Painter et al. (1980) who found significant reductions in pain level from pre-to post-testing following interdisciplinary pain treatment.

**Pain Interference.** Toomey et al. (1991) hypothesized that an attitudinal measure of perceived control of pain would be related consistently to reports of reduced environmental impact of pain in such areas as health care utilization, functional ability and work. This is in line with hypothesis three (High PLOCI and decrease in pain interference) of this study. This was not confirmed by their research which had a pre-treatment measure only. However, this present study did find a significant interaction between internality and pain interference as measured by items on the INTF at pre- and post-treatment (i.e. going to work, performing household chores, recreation and hobbies, and doing physical exercise) as Guck's (1985) study did. This study also had pre-INTF measures which followed the method of the previously cited studies.

Dolce et al. (1986) observed that chronic pain patients' post-treatment self-efficacy ratings were
significantly correlated with exercise levels, medication use, and work status at follow-up periods that ranged from six months to one year. Dolce and his colleagues have suggested that if self-efficacy expectancies are related to maintenance, than those who do not increase their perceptions of self-efficacy following treatment, despite any other post-treatment improvements, are likely to be good candidates for recurrent pain. Stevens et al. (1988) also emphasized the importance of an individual’s perceptions of his/her pain and suggested that individual differences in perceptions associated with post-treatment improvements may be useful predictors of patients prone to recurrent pain.

Philips (1987) found a significant correlation between patients’ self-efficacy and self-ratings of the magnitude of their pain problem at one year follow-ups. The dramatic change in the relationship suggests the possibility that an important effect of treatment is the development of a sense of control over pain (Philips, 1987). Nitti (1981) found that chronic pain patients scoring in the mid-external range on Rotter’s Locus of Control (1966) scale also demonstrated
significant changes toward internality after EMG biofeedback treatment.

Hudzinski and Levenson (1985) found that chronic headache patients suffering the most from a biofeedback behavioral treatment at follow-up had an internal locus of control. Maruta et al. (1979) found that successfully and unsuccessfully treated patients differed significantly on prior duration of the pain, work time lost because of pain, number of surgical procedures related to the pain, dependence on medication, and pain level at the beginning of the program. The results of the present study are consistent with all of these cited studies.

**Exploratory Analyses**

Two exploratory stepwise regression analyses were done to determine what were the best predictors of the VAS (pain level) and INTF (pain interference). The predictors used were age, sex, time since treatment began, and the three PLOC subscales.

Results indicated that the Powerful Others subscale of the PLOC and age were the two best predictors for level of pain as measured by the VAS. It is possible to assert that as the score on the
Powerful Others subscale increases and as age increases, so does the total score on the VAS. This means that a Powerful Others orientation coupled with increased age yields higher ascertainment of level of pain.

The Powerful Others subscale was the only predictor of level of pain interference. It is possible to say that as the score on the Powerful Others subscale increases, so does the total score on the INTF. This means that a Powerful Others orientation yields a higher ascertainment of pain interference.

The present study's author's theory speculates that internality would have predicted a lower VAS and INTF. Because PLOCI was related significantly to PLOCPO, it explained no unique variance over and above that already provided by PLOCPO in the stepwise equation. Because the relationship between PLOCI and PLOCPO is significant and negative in this study and in Schaefer's (1989), one might conclude that internality does predict VAS and INTF in the hypothesized directions. Further, one might conclude that, while obtaining an internal orientation helps lower pain
intensity and interference, it may be more important to avoid a powerful others orientation to lower pain intensity and interference. This conclusion is consistent with the findings of Keefe et al. (1986) who report that it may be more important to avoid maladaptive coping behaviors than to actually develop any form of positive pain coping strategies.

Previous research (e.g. Hudzinski & Levenson, 1985) has found age to be a treatment factor. Older people were less successful in pain reduction and showed greater external locus of control. It is logical to expect that younger patients would respond better to treatment than older people since they may be less conditioned to a pattern (cycle) of pain by virtue of having experienced fewer years of their particular pain ailment. It also seems reasonable, as was found in this study, that persons high on the Powerful Others orientation would be older since listening to and following the advice of physicians for management of pain has been the traditional way to relieve pain.

These issues raise the point that it may be necessary to partial age out and control for age to avoid having it as a confounding variable. The results
produced may be markedly different as predictors of the VAS and the INTF.

Limitations of the Study

The PLOC was used as a follow-up measure only. As described in detail earlier, the time of administration of the instrument has a marked effect upon results. Using the PLOC as a follow-up measure only does not allow any type of predictions with respect to response to specific treatment intervention strategies.

This was a retrospective study. Retrospective studies are not always accurate since the experimenter is relying upon the memory capacity of individuals. It is possible that many subjects did not remember the exact number of times activities were performed and that they really approximated an exact amount. They also may have based the ideal number of times upon the actual number of times (i.e. adding 1-2 times to come up with an ideal number) which may not have really matched their "true" ideal numbers.

There also seemed to be great confusion among the subjects as to how to assign values to AVERB and AVERC. Some of the activities were intangibles (such as the assertiveness techniques) and therefore hard to
estimate or even remember how many times they were or should be used. It is also difficult to judge how often one wishes to use a skill of that nature. There were also some subjects who rated activities as important but did not do them nor wished to do so. These are issues that call into question the reliability of the SOVU as well as being real sources of error that are inherent in any survey research.

A major disadvantage to correlational designs is that causality cannot be assumed from demonstrated relationships (PLOC orientations; scores on the SOVU). To make a logical argument that there is a possible causal relationship between a correlational study’s variables that warrants further non-correlational investigation, the predictors and criterion must covary, the predictor(s) must precede the criterion in time, and there must be no more plausible alternative explanations for the relationship.

The most frequent correlational design is the type undertaken in this study in which all variables are measured at a single point in time, using scales administered to some group. Variables that are measured at a single point in time tend to be related
more than those measured at different points. This similarity may be because study participants are striving for consistency in reports of behavior, attitudes, and health status. One variable may cause another or they may be caused by a third variable that may or may not have been measured by the study. Reliability information may not be available, as was the case in this study.

The time between treatment and follow-up varied for all patients. One does not know if the same results would be obtained if everyone had had equal distance in follow-up times.

Although it was not possible to say that the treatment at the Pain Management Center was solely responsible for the decrease in scores, the pre-to post-treatment differences point to the conclusion that something positive was happening, with clear reductions in pain level and pain interference level being the result. Mitigating factors play into the decreases in the level of pain patients experience and their view as to the extent to which the pain interferes in their lifestyle. Due to patients' reported reduction in pain behaviors and reported increase in pain tolerance,
however, it is possible to assert that the Pain Management Center is an institution capable of effecting change. Supportive family members and friends, exercise, a healthy outlook on life, and even the weather can all be said to influence how patients feel about their pain levels and interference perceptions, but the decrease in scores and the successfulness of the interdisciplinary pain center approach, as evidenced by pain-freer people, begins to answer the "whys" of such results.

Suggestions for Further Research

Future research with the PLOC should include standardized behavioral measures of function. These protocols, in addition to self- and spouse-report, should employ a consistent item format, preferably with explicit response alternatives.

With regards to the SOVU, a test-retest reliability check should be established. The actual times, ideal times, and importance ratings may be made more accurate and reliable if the activities were stated as to whether or not they had been assigned to that particular patient, based on their charts and
treatment progress notes and then have the patient rate them.

It is probable that the activities would be rated differently. Certain activities that patients "were sure" the Center assigned to them may have been their own doing. Certain activities that were important immediately after discharge may not be seen as important two to four years down the road.

Future research aims at assessing what degree of post-treatment adherence is necessary within specific regimens to maintain or improve upon treatment gains for specific problems is warranted. Greater attention, both clinically and experimentally, needs to be given to adherence, relapse, and long-term maintenance. Clinicians should plan for and design treatments to facilitate maintenance and generalization. Clinicians and investigators need to acknowledge the problem of nonadherence and address it throughout the treatment program.

It is important to relate expectancies and preferences for control with actual environmental conditions. It will not be particularly helpful to a patient to be encouraged to perform some type of
therapeutic intervention strategy if it is not environmentally possible or realistically conceivable as a "healthy" response to a noxious event.

Existing data provide a strong basis for the systematic incorporation of various means of evaluating locus of control beliefs into diagnostic and therapeutic technology. This calls for the development of more situation-specific I-E instruments. More precise instruments will be achieved through subscale approaches that indicate the strength of the individual's locus of control beliefs in several different areas.

Instruments concerned with specific health areas will suit experimental purposes. Research studies attempting to relate health (pain) locus of control beliefs to health (pain) behavior should measure those behaviors directly and not rely on health-status measures.

The present study shows the association of internality with selected pain assessment variables. Assuming that variations in perceived control exist and affect pain perception in chronic pain patients, a more
fundamental clinical question relates to the stability versus the modifiability of control attributions. This raises the questions of whether or not treatment programs should be tailored to individual differences in locus of control as suggested by Wallston et al. (1978) or can perceptions of control be altered by specific interventions. An indication of this would be changes in the PLOC scores as a function of treatment.

The present findings suggest that the PLOC is a promising tool for assessing the relationship between perceptions of self-control and pain report in chronic pain patients. The questions of whether or not the PLOC is a state that intervention strategies may be able to alter or a more stable trait that makes it difficult to tailor treatment to a different orientation (either Powerful Others or Chance) are issues that research must address and consequently develop strategies in order to aid the maximum amount of patients. Future research is needed to determine the utility of the PLOC as a predictor and/or criterion of response to pain treatment strategies.
References


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a social influence situation. *Journal of Personality, 35*, 547-561.


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Toomey, T.C., Mann, J.D., Abashian, S.W., & Thompson-Pope, S. (1991). Relationship between


October 8, 1991

Dear ____________________

Greetings from the Pain Management Center. I am writing to ask for your help in a research project we are doing that will allow us to better serve patients in the Pain Program. Enclosed you will find several forms that we would like to have you fill out and return in the enclosed self-addressed stamped envelope. It should take about 15 or 20 minutes to complete the forms. Your assistance in this project will be extremely beneficial. If you could send the material back as quickly as possible, that would be very helpful. Please do not do as I do which is to allow mail to stack up and then I never find it until three months later when I've reached the bottom of the stack.

Should you have any questions about this project or how to answer the questions, please do not hesitate to contact us. In addition, while answering any of these questions, if they cause sufficient distress and you would like to visit with a staff member please call us at (402)559-4364.

Again, thank you very much for your assistance in this project.

Sincerely,

[Signature]

Thomas P. Guck, Ph.D.
Clinical Coordinator
University of Nebraska Medical Center

Encl.
Appendix B

Name: _______________ Date: __________ Age: _____ Sex: Male Female

PLOC

Please circle the number that represents the extent to which you disagree or agree with each of the following statements. Please make sure that you answer every item and that you circle only one number per item. This is a measure of your personal beliefs; there are no right or wrong answers. Please read each statement carefully, but do not spend too much time on any one item.

1) strongly DISAGREE  2) moderately disagree  3) neutral  4) moderately agree  5) strongly AGREE

1 2 3 4 5  1. If my pain gets worse, it's my own behavior which determines how soon it gets better.

1 2 3 4 5  2. No matter what I do, if my pain is going to get worse, it will get worse.

1 2 3 4 5  3. Having regular contact with my physician is the best way for to avoid having my pain become worse.

1 2 3 4 5  4. Most things that affect the amount of pain I experience happen to me by accident.

1 2 3 4 5  5. Whenever my pain gets worse, I should consult a medically trained professional.

1 2 3 4 5  6. I am in control of the amount of pain I experience.

1 2 3 4 5  7. My family has a lot to do with whether my pain gets better or worse.

1 2 3 4 5  8. When my pain gets worse, I am to blame.

1 2 3 4 5  9. Luck plays a big part in determining how soon my pain will get better.

1 2 3 4 5  10. Health care professionals control whether my pain gets better or worse.

1 2 3 4 5  11. When my pain gets better, it's largely a matter of good fortune.

1 2 3 4 5  12. The main thing which affects the amount of pain I experience is what I do.

1 2 3 4 5  13. If I take care of myself, I can avoid having my pain become worse.

1 2 3 4 5  14. When my pain becomes better, it's usually because other people (for example, doctors, nurses, family friends) have been taking good care of me.

1 2 3 4 5  15. No matter what I do, my pain is likely to get worse.

1 2 3 4 5  16. If I take the right actions, I can avoid having my pain become worse.

1 2 3 4 5  17. Regarding my pain, I can only do what my doctor tells me to do.

1 2 3 4 5  18. If it's meant to be, my pain will not become worse.

(SEE BACK)
Appendix B (cont.)

(1) strongly DISAGREE  (2) moderately disagree  (3) neutral  (4) moderately agree  (5) strongly AGREE

1  2  3  4  5  19. If my pain gets worse, I have the power to make it better.
1  2  3  4  5  20. Often I feel that no matter what I do, if my pain is going to get worse, it will get worse.
1  2  3  4  5  21. If I see an excellent doctor regularly, my pain is less likely to get worse.
1  2  3  4  5  22. It seems that the amount of pain I experience is greatly influenced by accidental happenings.
1  2  3  4  5  23. I can avoid having my pain become worse only by consulting health care professionals.
1  2  3  4  5  24. I am directly responsible for the amount of pain I experience.
1  2  3  4  5  25. Other people play a big part in whether my pain becomes better or worse.
1  2  3  4  5  26. If my pain becomes worse, it’s my own fault.
1  2  3  4  5  27. When my pain becomes worse, I just have to let nature run its course.
1  2  3  4  5  28. Health care professionals keep my pain from becoming worse.
1  2  3  4  5  29. When my pain gets better, I’m just plain lucky.
1  2  3  4  5  30. The amount of pain I experience depends on how well I take care of myself.
1  2  3  4  5  31. When my pain becomes worse, I know it is because I have not been taking care of myself properly.
1  2  3  4  5  32. The type of care I receive from other people is what is responsible for whether my pain gets better.
1  2  3  4  5  33. Even when I take care of myself, it’s easy for my pain to become worse.
1  2  3  4  5  34. When my pain becomes worse, it’s a matter of fate.
1  2  3  4  5  35. I can pretty much avoid having my pain become worse by taking good care of myself.
1  2  3  4  5  36. Following doctor’s orders to the letter is the best way to avoid having my pain become worse.
Appendix C

INSTRUCTIONS: PLEASE COMPLETE THE FOLLOWING.

AGE: ______

MALE: _____ FEMALE: _____

RACE: CIRCLE THE CORRECT CATEGORY.

A. WHITE
B. BLACK/AFRICAN AMERICAN
C. HISPANIC
D. AMERICAN INDIAN
E. ASIAN/PACIFIC ISLANDER
F. OTHER

INSTRUCTIONS: PLEASE PLACE AN "X" ON EACH LINE WHERE IT MOST ACCURATELY DESCRIBES YOUR PAIN.

<table>
<thead>
<tr>
<th>GOOD DAY</th>
<th>BAD DAY</th>
<th>AVERAGE THIS MONTH</th>
<th>TODAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAIN AT ITS WORST</td>
<td>PAIN AT ITS WORST</td>
<td>PAIN AT ITS WORST</td>
<td>PAIN AT ITS WORST</td>
</tr>
<tr>
<td>NO PAIN</td>
<td>NO PAIN</td>
<td>NO PAIN</td>
<td>NO PAIN</td>
</tr>
</tbody>
</table>

(SEE BACK)
INSTRUCTIONS: PLEASE CIRCLE THE NUMBER WHICH BEST DESCRIBES YOUR PAIN SITUATION FOR EACH LETTERED ITEM BELOW.

 HOW MUCH DOES YOUR PAIN INTERFERE WITH THE FOLLOWING ACTIVITIES AT THIS TIME?

(1) NOT AT ALL  (3) MODERATELY  (5) EXTREMELY
(2) A LITTLE BIT (4) QUITE A BIT

A. GOING TO WORK  1  2  3  4  5
B. PERFORMING HOUSEHOLD CHORES  1  2  3  4  5
C. YARD WORK OR SHOPPING  1  2  3  4  5
D. SOCIALIZING WITH FRIENDS  1  2  3  4  5
E. RECREATION AND HOBBIES  1  2  3  4  5
F. HAVING SEXUAL RELATIONS  1  2  3  4  5
G. DOING PHYSICAL EXERCISE  1  2  3  4  5
H. SLEEP  1  2  3  4  5
Listed below are therapeutic intervention strategies that you may be using for your pain management. Please complete the following:

1. If you were encouraged to use this strategy by your pain management team, please circle "Y" for Yes, "N" for No.

2. Please fill in the number of times per week that you perform each activity.

3. Please fill in the number of times per week you WISHED you performed each activity in the "Ideal" column.

4. Please fill in the number that represents the extent to which you see this activity as important to you:

<table>
<thead>
<tr>
<th>Not at all Important</th>
<th>Somewhat Important</th>
<th>Moderately Important</th>
<th>Quite Important</th>
<th>Extremely Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th># of times per week</th>
<th>Ideal # per week</th>
<th>Importance</th>
</tr>
</thead>
</table>

1. Exercise in the morning  
   Y  N  ____  ____  1 2 3 4 5

2. Walk, climb stairs, bike, swim, or engage in other physical activities  
   Y  N  ____  ____  1 2 3 4 5

3. Use of ice on pain area  
   Y  N  ____  ____  1 2 3 4 5

4. Listen to relaxation tapes  
   Y  N  ____  ____  1 2 3 4 5

5. Use breathing exercises  
   Y  N  ____  ____  1 2 3 4 5

6. Pace my activity  
   Y  N  ____  ____  1 2 3 4 5

7. Take breaks from my routine  
   Y  N  ____  ____  1 2 3 4 5

8. Avoid narcotic use  
   (e.g., I thought about using a narcotic medication, but chose not to.)  
   Y  N  ____  ____  1 2 3 4 5

(SEE BACK)
<table>
<thead>
<tr>
<th># of times</th>
<th>Ideal #</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td># of times</td>
<td>Yes/No</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

9. Use assertiveness techniques (e.g., setting limits, saying no, expressing my feelings) | Y | N | ____ | ____ | 1 2 3 4 5 |

10. Divert my attention (e.g., counting numbers in my head, running a song through my head) | Y | N | ____ | ____ | 1 2 3 4 5 |

11. Reinterpret my pain sensations (e.g., "I tell myself to feel numbness, not pain"). | Y | N | ____ | ____ | 1 2 3 4 5 |

12. Use positive coping self-statements (e.g., "I will carry on"). | Y | N | ____ | ____ | 1 2 3 4 5 |

13. Ignore pain sensations (e.g., telling myself it doesn't hurt) | Y | N | ____ | ____ | 1 2 3 4 5 |

14. Pray | Y | N | ____ | ____ | 1 2 3 4 5 |

15. Avoid catastrophizing/negative self-statements (e.g., I had an opportunity to worry or catastrophize about my pain, but chose not to.) | Y | N | ____ | ____ | 1 2 3 4 5 |

16. Avoid pain behaviors (e.g., I had an opportunity to guard, limp, grimace, or talk about my pain, but chose not to.) | Y | N | ____ | ____ | 1 2 3 4 5 |