

# Path Model of Treatment Outcome in a Multidisciplinary Pain Management Clinic

**Daisha J. Cipher**, Southern Methodist University  
**P. Andrew Clifford**, Cognitive Psychophysiological Institute at Dallas

The treatment of chronic pain disorders has become multifaceted as the field of pain research has recognized the complex nature of chronic pain. Multidisciplinary pain management has been developed in order to address the complexities of chronic pain disorders. However, in the study of multidisciplinary pain management, there have been few models predicting patients' response to treatment. This study examined a path model of treatment outcome, incorporating such variables as coping styles, treatment compliance, and treatment outcome. Results indicated that a coping style involving the suppression of negative emotion is associated with more treatment compliance, functional capacity, and perceived life control. A coping style involving amplification of negative emotion was found to be associated with poorer treatment compliance, functional impairment and emotional distress, such as depression and anxiety. Possessing an aggressive coping style was found to be associated with poor treatment compliance, as well as anger, hostility, and a low probability of benefiting from a treatment program.

Chronic pain is reported by 80 million Americans (Bonica, 1987), and 60% of all social security disability claims involve the allegation of pain (Simmons, Avant, Demski, & Parisher, 1988). In view of the vast empirical support for psychological treatments for pain, the strict biomedical intervention for pain has given way to multidisciplinary pain management (Flor, Fydrick, & Turk., 1992). Multidisciplinary pain management typically incorporates not only pharmacotherapy and physical therapy, but also biofeedback, operant conditioning, relaxation and cognitive restructuring. The most common goals of multidisciplinary pain centers (MPCs) are functional capacity, pain reduction, reduction in addictive medication, reduction of health-care utilization, increased activity including return to work, closure of disability claims, and reduction in emotional distress, with functional capacity considered most important, by clinicians and insurance companies alike (Turk, 1996).

In the MPC treatment outcome research, most salient is the need for predictors of success (and for that matter, failure) of MPC treatment. Such predictors would allow clinicians to identify those patients who will benefit from an MPC approach, and those who might need an alternative form of treatment. Preliminary studies have indicated that the coping scales of the Millon Behavioral Health Inventory (MBHI) are good predictors of behavioral treatment outcomes (Wilcoxson et al., 1988, Gatchel et al., 1985), and there is evidence that these scales can be used to classify distinct coping styles of chronic pain patients (Dickson et al, 1992, Cipher & Clifford, 1996; Marron et al, 1984). The MBHI coping scales are described below (see Table 1).

A recent factor analysis (Cipher, 1999) performed on the eight MBHI coping styles confirmed past cluster analytic findings of Cipher & Clifford (1996), as well as the actual authors of the MBHI.

The factors extracted are summarized below:

## *Factor One: Expression of Negative Emotion.*

The MBHI Inhibited and Sensitive Scales loaded negatively on Factor One, consistent with other studies finding these scales to be grouped together (Dickson et al., 1992; Gatchel et al, 1985; Marron et al., 1984). The Confident and Sociable scales loaded positively on Factor One. Based on these loadings and the results from the correlational analyses, Factor One appears to be a dimension of expression of negative emotion. That is, on one end of the dimension, there appears to be a high reporting of emotional distress and neuroticism. On the other end, there is an underreporting of distress coupled with high defensiveness. For example, Factor One is negatively correlated with affective distress, functional impairment, depression, and overall psychopathology (MPI I, MPI AD, MMPI-2 D, MMPI-2 F scales). Factor One is positively correlated with a subjective sense of life control (MPI LC scale), and positively correlated with defensiveness and the denial of psychopathology (MMPI-2 K and F scales, respectively) – similar to a “Polyannish” attitude. Thus, on one end of the dimension, there is suppression of negative emotion, and on the other end, “amplification” of negative emotion. Consequently, it appears that Factor One has largely captured the clusters found by Cipher and Clifford (1996) onto one dimension, with suppression of negative emotion and stress on one end (e.g. Repressors), and amplification of negative emotion on the other (e.g. Amplifiers).

*Factor Two: Aggression.* The Cooperative scale loaded negatively on Factor Two, while the Forceful scale loaded positively. This factor appears to be a dimension of aggression. One end of the dimension represents aggression and forcefulness. The other end represents passiveness and cooperation. Correlational analyses revealed Factor Two to be positively related to anger, cynicism, anti-social practices and Type A

behavior (MMPI ANG, CYN, ASP, and TPA scales, respectively). Factor Two is not related to neuroticism per se; rather, it is associated with anger, hostility, resentment of authority, having a temper, being impatient, and being critical. Factor Two was negatively related to defensiveness, and is associated with frankness and self-centeredness (MMPI K scale). In sum, Factor Two appears to be separate from amplification; it is a dimension of active independence, anger, and resentment on one end, and passive dependence and cooperation on the other.

This study examined the role of coping styles in the chronic pain patient's treatment compliance and outcome in order to identify those patients who respond (and do not respond) to multidisciplinary pain management. Patients' compliance with their treatment regimen is an important factor in any clinical setting, but is often overlooked when examining treatment outcome and cost effectiveness. In one of the few studies quantifying treatment compliance in the pain management context, Lutz, Silbret and Olshan (1983) found a significant relationship between compliance and treatment outcome. However, compliance has not been examined as a mediator between coping/personality styles and outcome.

The findings of Cipher and Clifford (1996) indicated that certain coping styles might be predictive of chronic pain patients' treatment compliance and post treatment outcome. As outlined by Turk (1996), functional impairment is one of the most common and useful outcome variables examined in multidisciplinary pain centers. This study assessed the predictive value of the MBHI coping styles in a cognitive-behavioral pain management treatment outcome model, with treatment compliance as a mediator between coping styles and treatment outcome. Figure 1 below illustrates the proposed model of treatment outcome.

**Table 1.** Brief Descriptions of High Scorers on the MBHI Coping Style Scales

Style	Description
Introversive	Keeps to self, quiet, unemotional, not easily excited, lacks energy
Inhibited	Shy; socially ill-at-ease, avoids close relationships, fears rejection
Cooperative	Soft-hearted, reluctant to assert self, submissive, dependent
Sociable	Charming, emotionally expressive, histrionic, talkative
Confident	Self-centered, egocentric, acts self-assured
Forceful	Domineering, abrasive, intimidates others, blunt, aggressive
Respectful	Serious-minded, efficient, rule conscious, emotionally constrained
Sensitive	Unpredictable, moody, passively aggressive, negativistic

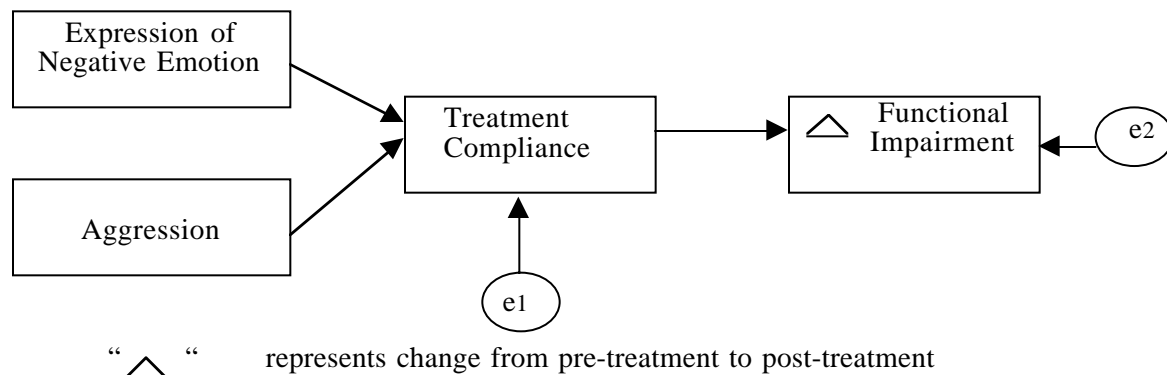
### Method

Data were collected from 67 outpatients who completed treatment at a University pain clinic. All patients had been previously diagnosed with some sort of chronic pain syndrome. Exclusion criteria were the presence of any cognitive deficits due to neurological disorders, progressive terminal illnesses, or any other medical conditions which were not stable (e.g. end-stage cancer). The most common diagnoses were low back pain, neck/shoulder pain, headache, neuropathy, and fibromyalgia. The average age of patients was 45 years old.

### Treatment.

Treatment consisted of multi-disciplinary pain management, which included cognitive-behavioral therapy incorporating biofeedback and relaxation train-

**Figure 1.** Path Model of MPC Treatment Outcome



ing, and pharmacotherapy. Licensed psychologists provided cognitive-behavioral therapy. Pharmacotherapy was provided on a monthly basis by attending anesthesiologists. Goals of pharmacotherapy involved tapering the patients to lowest possible dosages of analgesics required to minimize the pain.

### Measures

*Millon Behavioral Health Inventory (MBHI).* The Millon Behavioral Health Inventory (MBHI; Millon, Green, & Meagher, 1979) was designed to measure people's response to medical evaluation and treatment. The MBHI consists of eight scales which assess coping styles in the medical setting as well as 14 other scales measuring psychogenic attitudes, somatization, and prognoses. The eight coping styles on which this study focuses include Introversive, Inhibited, Cooperative, Sociable, Confident, Forceful, Respectful, and Sensitive (see Table 1 for descriptions). The MBHI appears to be a valid and reliable instrument (Millon, Green, & Meagher, 1982). The factor scores produced by the MBHI factor analysis will be used to represent coping styles in this study.

*Treatment Compliance/Collaboration Rating Scales.* These rating scales were developed in order to measure the level of treatment compliance, interpersonal rapport, alliance, and collaboration between the therapist and the patient in a multidisciplinary pain treatment setting. No other instrument of this kind has yet been developed. Domains of the treatment compliance/collaboration rating are pain management, relaxation, emotional management, activity management, social functional restoration, recreational functional restoration, vocational functional restoration, substance/medication management, weight management, and autonomic nervous system management/neuromuscular re-education (see Appendix A). Domains of compliance/collaboration are rated by the patient's attending psychologist on a 5-point scale ranging from Needs Improvement to Self-Directed. An Overall Compliance Score is computed by adding the 10 ratings and dividing by the number of domains rated (e.g. excluding "not applicable"). For a sample of 31 patients, the median inter-rater reliability for the overall compliance score was found to be .87 among three raters (therapists).

*Multidimensional Pain Inventory (MPI).* The West Haven-Yale Multidimensional Pain Inventory (MPI; Kerns, Turk, & Rudy, 1985), as described in Study I, is a comprehensive, psychometrically sound instrument which is composed of three sections with a total of 13 empirically derived scales (Kerns et al., 1985). The present study focuses on only one of the scales, Interference. The Interference scale assesses the patient's perception of how much and in what ways the patient perceives his/her pain to affect daily

functioning, and thus will be used to represent functional impairment. The means and standard deviation for the Interference scale among a sample of chronic pain patients are  $M=55.66$ ,  $SD=7.98$ . Higher numbers are indicative of more functional impairment. The MPI is a reliable and valid instrument (Jamison, Rudy, Penzien, & Mosley, 1994). An improvement score was generated for each patient by subtracting the pre-treatment Interference score from the post-treatment Interference score. Thus, negative scores are indicative of improvement from pre-treatment to post-treatment.

### Procedure

The patients receiving treatment at the pain center completed the MBHI during their first visit. After completing 18-22 sessions of cognitive-behavioral therapy within a 6-month period of time, the patients were administered the MPI. Within two months after patients completed treatment, their attending psychologist completed a Treatment Compliance Rating Scale.

### Data Analysis

The factors retained from the factor analysis represented the classifications of coping styles in the current path model. First, these factors were correlated with treatment compliance ratings and improvement in functional capacity. A path analysis was then conducted to obtain direct and indirect effects between the variables, allowance for error terms (e.g. measurement error), a model  $R^2$ , and an indication of overall "fit" of this model. Path analysis also allowed for multiple dependent variables in one path model (as compared to multiple regression, which only allows one dependent variable at a time to be analyzed). Path analysis allowed for a graphical representation of relationships between variables, as represented by path coefficients. Path coefficients are either Pearson correlation coefficients or beta weights, depending upon the number of variables predicting the endogenous (dependent) variable (Schumacker & Lomax, 1996). Model fit indices yielded a) the difference between the path coefficients and original (correlation) coefficients among the variables (thus indicating any under/overidentification of the model); and b) the likelihood that this model will replicate across different samples of chronic pain patients. The path diagram, as illustrated in Figure 1, shows treatment compliance/collaboration as hypothesized to be the mediating variable between coping styles and treatment outcome. The  $R^2$  for predicting treatment compliance was .375 and the  $R^2$  for predicting functional impairment was .274. The  $R^2$  for the path model is therefore equal to:  $1 - (1 - .375)(1 - .274) = .546$ .

### Results

Correlational analyses revealed Factor One (Expression of Negative Emotion) to be positively related to compliance, whereas Factor Two (Aggression) was negatively related to compliance (Table 3). Compliance was positively related to reductions in functional impair-

**Table 2.** Means for Treatment Outcome Variables

	Mean	Standard Deviation
Factor1	0.03	1.02
Factor2	0.02	1.04
Compliance	3.70	0.62
Interference (Improvement)	-1.44	1.17

ment. As shown in Table 4, the fit indices for this model appear to be a good model fit. However, correlations between compliance and the other variables may be underestimated due to the small variance associated with compliance (see Table 2). The lowest compliance rating given a patient was a three (out of five points). Thus, most patients in this study were rated as having at least satisfactory overall treatment compliance.

### Discussion

These results lend support for a mediational model of treatment outcome in a pain management center. Coping styles predict the manner in which patients comply with treatment, and compliance predicts patients' improvements in functional capacity. Results indicate that amplification of emotional distress leads to less compliance with treatment, resulting in poorer outcome. The more emotionally constrained or stabilized, the more compliance patients exhibit and in turn, the higher improvements they attain in functional capacity. Likewise, the more aggressive and forceful patients are in their coping styles, the less likely they are to comply and respond to treatment.

Thus, it appears that possessing a defensive, Polyannish style of coping is much more advantageous in terms of complying with treatment and having a positive treatment outcome. Undergoing emotional distress, depression, and/or other psychopathology, coupled with a lack of defensiveness, appears to put patients at risk for not complying with treatment, and in turn, having a poor treatment outcome. Moreover, being forceful, having Type A personality traits, and being aggressive is also a detriment to treatment compliance and outcome.

The confirmation of this model emphasizes the importance of treatment compliance in MPCs. Moreover, the psychologist-rated compliance scales appeared to be useful as a measure of treatment compliance as well as a predictor of treatment outcome. Compliance appears to be the link between coping/personality styles that patients possess when entering into treatment, and the improvement they've accomplished by the end of treatment. These findings confirm that of other studies using the MBHI as predictors of compliance in health care settings (Tracy et al, 1988).

**Table 3.** Correlations Among Treatment Outcome Variables (N=67)

	Improvement	Compliance	Factor1
Improvement	1.00		
Compliance	-0.21	1.00	
Factor1	-0.04	0.25	1.00
Factor2	-0.09	-0.33 *	-0.06

Note. \* indicate values with probability of  $p < .05$ .

### Conclusions

Findings from Study II indicate that having a coping style that involves suppression and denial of negative emotion facilitates compliance with treatment. However, these findings are not intended to suggest that suppressing negative emotion is *functional*. Possessing defensive coping traits (e.g. being emotionally constrained/stable, Polyannish) can be healthy when one is living a relatively stress-free life. However, when the non-expressive person is faced with a severe stressor that does not go away, such as a chronic pain disorder, denying emotional distress and being defensive may become maladaptive (Wickramasekera, 1993). This phenomenon has been evidenced in the study of End State Renal Disease patients. Social withdrawal and social alienation were found to be significantly related to poor compliance and poor prognosis (Tracy et al., 1987). Likewise, in a study by Esterling et al. (1990), those chronic pain patients who were repressors, were non-expressive, and disclosed little about themselves were found to have the lowest levels of immune functioning. Defensiveness, which is closely related to avoidance and non-disclosure, has also been found to be related to lower levels of immune functioning (Jamner et al, 1988). Consequently, while being on the non-expressive end may appear to be better than being on the amplifying end, both are likely to be dysfunctional for patients in the long run.

Expression of Negative Emotion and Aggression are, by and large, orthogonal factors. Patients scoring either high or low on Expression of Negative Emotion can score either high or low on Aggression. Judging from the path analytic results, it is most desirable to score on the repressive end of the Expression of Negative Emotion factor and the passive end of the Aggression factor. These patients are likely to be most compliant with treatment and exhibit the most treatment improvements. The most difficult patients are most likely those who score on the amplifying end of Repression/Amplification and the aggressive end of Aggression. Not only are these patients suffering from high levels of emotional distress and functional impairment, but they are also hostile, resentful and aggressive in their approach to treatment. These patients are likely to be most difficult to work with and have a smaller chance of completing a treatment program.

Address correspondence to:

Daisha J. Cipher, Ph.D.  
Southern Methodist University  
Dallas, Texas 75275-0500

**Table 4.** Goodness of Fit Criteria for Path Model of Treatment Outcome.

Criterion	Value	Acceptable Level*
Chi-square	3.04	Tabled Chi-square value
GFI (Goodness of fit)	0.98	0 (no fit) to 1 (perfect fit)
AGFI (Adjusted GFI)	0.92	0 (no fit) to 1 (perfect fit)
RMSEA (Root-mean-square error of approximation)	0.01	<.05
AIC (Akaike information criterion)	17.04	Negative value = poor fit

Note. \* based on Schumaker & Lomax, 1996.

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