

Coping Style Influences Compliance with Multidisciplinary Pain Management

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Abstract

The treatment of chronic pain disorders has become multifaceted in recognition of the complexities of chronic pain. However, few models have emerged to predict patients' response to treatment. This study examined a path model of pain treatment outcome, incorporating the variables of coping style and treatment compliance. Results indicated that the suppression of negative emotion was associated with greater treatment compliance, whereas amplification of negative emotion was found to be associated with poorer treatment compliance. An aggressive coping style was found to be associated with poor treatment compliance. In turn, poor compliance predicted poor pre-/post-treatment functional capacity. Moreover, a path model incorporating compliance as a mediator between coping styles and functional impairment revealed an excellent model fit when compared to a path model with no mediators.

Keywords

compliance, coping style, multidisciplinary, pain management, path model

IN VIEW OF the vast empirical support for psychological treatments of pain, the strict biomedical intervention for pain has given way to multidisciplinary pain management (Flor, Fydrich, & Turk, 1992; Keefe, Gil, & Rose, 1986). Multidisciplinary pain management typically incorporates not only pharmacotherapy and physical therapy, but also psychosocial interventions in the form of contingency management, relaxation, biofeedback and cognitive restructuring. The most common goals of multidisciplinary pain centers (MPCs) are alleviation of pain and distress, reduction in addictive analgesic medications, increased activity levels (including return to work), reduced health-care utilization, closure of disability claims and most importantly the restoration of functional capacity (Turk, 1996).

In the evaluation of MPCs, there has been a search for predictors of both treatment success and failure. Such predictors allow clinicians to identify those patients most likely to benefit from an MPC approach, versus those who might need alternative forms of treatment. Accordingly, there has been an expansion of interest beyond the type of treatment to the type of patient, in particular, how the patient copes with pain. This is not merely about the particular cognitive or behavioral strategy adopted during an episode of pain; it is about enduring patterns in the way one handles pain. Also termed coping styles, such patterns are revealed in the patient's attitude, affect and interpersonal relations, all of which have ramifications for the patient's health and response to treatment.

The relevance of coping styles to health has been the subject of much speculation and investigation (e.g. Goldstein & Antoni, 1989; Kleinke, 1992; Lazarus & Folkman, 1984; Tracy, Green, & McCleary, 1987; Wilcoxson, Zook, & Zarski, 1988). Certain coping styles have been related to medical symptoms such as cancerous growth (Goldstein & Antoni, 1989; Jensen, 1987) decreased monocyte counts (Jamner, Schwartz, & Leigh, 1988), while others have predicted healthy outcomes of treatment in a multitude of settings (e.g. Kleinke, 1992; Weisberg & Page, 1988; Wilcoxson et al., 1988).

One clinically useful system for differentiating a number of coping styles relevant to health psychology is the Millon Behavioral Health Inventory or MBHI (Millon, Green, &

Meagher, 1982). Preliminary research suggests that the MBHI coping styles can be used to classify the chronic pain population into sub-groups with different prognoses and treatment outcome (Cipher, Clifford, & Schumacker, in press; Dickson, Hays, Kaplan, Scherl, Abbott, & Schmitt, 1992; Gatchel, Deckel, Weinberg, & Smith, 1985; Marron, Fromm, Snyder, & Greenberg, 1984). In comparison to the MMPI-2 (Butcher, Dahlstrom, Graham, Tellegen, & Kaemer, 1989), the MBHI has a narrower research base but is nevertheless reliable, far less time-consuming to complete, normed on a medical population and more predictive of exercise-oriented outcomes in pain management programs (Wilcoxson et al., 1988). Moreover, the MBHI differs from 'pain-specific' measures such as the Multidimensional Pain Inventory (Kerns, Turk, & Rudy, 1985) by assessing personality features. Since up to 60 percent of chronic pain sufferers seen in tertiary pain clinics meet criteria for at least one personality disorder (Fishbain, Goldberg, Meagher, Steele, & Rosomoff, 1986; Gatchel, Polatin, Mayer, & Garcy, 1994; Polatin, Kinney, Gatchel, & Lillo, 1993), it is useful to assess the dispositional traits of persons with chronic pain by such instruments as the MBHI.

Table 1 briefly describes each of the coping styles corresponding to the scales of the MBHI. As shown, there are eight styles that have been given convenient single-word labels: introversive, inhibited, cooperative, sociable, confident, forceful, respectful and sensitive. Though used in common parlance, these labels have specialized meanings in the present context, each coping style itself being a composite of traits manifested in interpersonal relations. Table 1 describes each of the coping styles corresponding to the scales of the MBHI.

Factor analysis of eight MBHI coping scales by the authors (Cipher, 1998) reduced them to two factors as summarized below.

Factor One: expression of negative emotion

The Inhibited and Sensitive scales of the MBHI loaded negatively on Factor One, consistent with other reports that these scales can 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

Table 1. Brief descriptions of high scorers on the MBHI coping style scales

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

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 (as suggested by correlations between Factor One and the MPI AD, MPI I, MMPI-2 D, MMPI-2 F scales, respectively). 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.

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, antisocial practices and Type A behavior (suggested by the correlations between Factor Two and 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 (suggested by the

correlation between Factor Two and the MMPI K scale). In sum, Factor Two appears to be 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 the coping styles described above in relation to the chronic pain patients' treatment compliance and treatment 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 to quantify treatment compliance in a pain management context, Lutz, Silbret, & Olshan (1983) found a significant relationship between compliance and treatment outcome. Personality traits have been linked to compliance with treatment in other populations (Edelman & Chambless, 1995), and compliance has been linked with treatment outcome (Funch & Gale, 1986). However, compliance has not been empirically examined as a *mediator* between coping/personality styles and outcome.

Our previous findings indicated that certain coping styles might be predictive of chronic pain patients' treatment compliance and treatment outcome (Cipher, 1998; Cipher et al., in press). The present study therefore 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. Furthermore, this hypothesized 'mediational' model of treatment outcome was compared with the traditional non-mediational (regression) model. Figs 1 and 2 illustrate the proposed models of treatment outcome that were tested and compared.

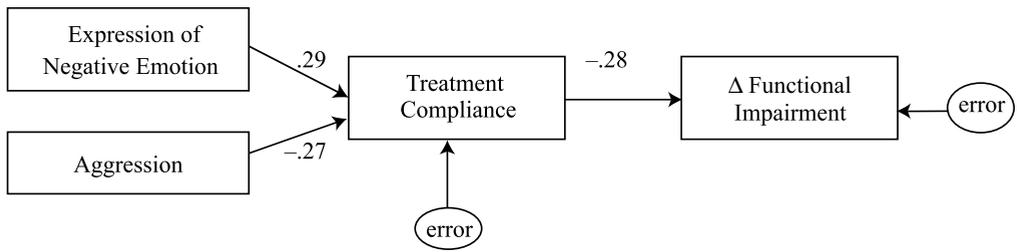


Figure 1. Mediation path model of MPC treatment outcome.
 Δ Represents change from pre-treatment to post-treatment

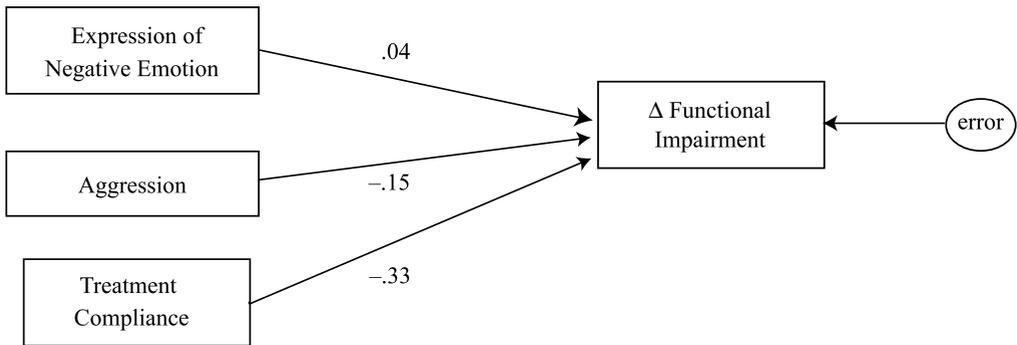


Figure 2. Non-mediation path model of MPC treatment outcome.
 Δ Represents change from pre-treatment to post-treatment

Method

Participants

Participants were 61 outpatients who completed multidisciplinary treatment at a University pain clinic. All patients had been previously diagnosed with some sort of chronic pain syndrome of which medical etiologies had been identified. This clinic was a tertiary setting, meaning that the patients in this sample had experienced recurrent intractable pain for more than six months, had limited success with traditional medical approaches and were referred to this pain management center for multidisciplinary evaluation and treatment. Patients reported experiencing pain most commonly in the low back, followed by mid-back, head, shoulder and neck. Eighty-seven percent of the participants reported experiencing pain in more than one site. Eighty-two percent of the sample reported experiencing pain for over one year and 33

percent of those patients reported experiencing pain for over five years. Patients' average age was 45, with 23 males and 38 females.

Intervention

The multidisciplinary pain management included pharmacotherapy as well as cognitive-behavioral therapy, which included biofeedback and relaxation training. Pharmacotherapy, provided on a monthly basis by attending anesthesiologists, involved medication-monitoring, analgesic prescription, and (when necessary) pain-relieving injections. Cognitive-behavioral therapy was provided by licensed psychologists.

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 assessing coping styles in the medical setting as well as 14 other scales measuring psychogenic attitudes, somatization and prognoses. The eight coping styles that form the focus of the present study include Introverted, Inhibited, Cooperative, Sociable, Confident, Forceful, Respectful and Sensitive (see Table 1 for descriptions). The MBHI appears to be a valid and reliable instrument, with published reliabilities for the coping scales ranging from .77 to .88 (Millon et al., 1982). The same factor scores produced by the MBHI factor analysis by Cipher (1998) will be used to represent coping styles in this study. The formula used to generate the factor scores representing Expression of Negative Emotion (NE) and Aggression, respectively, are as listed below:

$$\text{Expression of NE} = .45X_1 + -.92X_2 + -.09X_3 + .84X_4 + .85X_5 + .08X_6 + .15X_7 + -.81X_8$$

$$\text{Aggression} = -.56X_1 + .18X_2 + -.89X_3 + -.04X_4 + .40X_5 + .96X_6 + -.24X_7 + .50X_8$$

X_1 through X_8 are the z-scores of scores obtained on the MBHI coping style scales: Introverted, Inhibited, Cooperative, Sociable, Confident, Forceful, Respectful and Sensitive, respectively.

Treatment compliance/collaboration rating scales Since there appears to be no instrument to measure compliance with chronic pain treatment, a set of rating scales was developed to measure the level of treatment compliance, interpersonal rapport, alliance and collaboration between the therapist and the patient in a multidisciplinary pain treatment setting. Domains of the treatment compliance/collaboration rating include 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. Domains of compliance/collaboration were rated by the patient's attending psychologist on a five-point scale ranging from 'Needs Improvement' to 'Self-Directed'. An Overall Compliance Score was 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 split-half reliability was found to be .77 (among three raters). The median inter-rater reliability for the overall compliance score was found to be .87.

Multidimensional Pain Inventory (MPI) To measure functional impairment, a subscale from the MPI or West Haven-Yale Multidimensional Pain Inventory (Kerns et al., 1985) was selected. This is a comprehensive, psychometrically sound instrument composed of three sections with a total of 12 empirically derived scales (Kerns et al., 1985). These scales consist of items assessing pain, functional impairment, life control, social support, affective distress and behaviors associated with interactions with others. The present study focused 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 is therefore suited as an index of functional impairment. Functional impairment is one of the most common outcome variables in multidisciplinary pain centers, especially when alleviation of pain (as a goal of treatment) is not realistic for such chronic pain problems (Turk, 1996). The MPI is a reliable and valid instrument, with published subscale reliabilities ranging from .62 to .91 (Jamison, Rudy, Penzien, & Mosley, 1994). A residualized improvement score was generated for each patient by using the pre-treatment Interference score (independent variable) to predict the post-treatment Interference score (dependent variable). Negative scores are indicative of improvement from pre-treatment to post-treatment.

Procedures

Patients receiving treatment at the pain center completed the MBHI and MPI during their first visit. After completing 18-22 sessions of cognitive-behavioral therapy over a six-month period, they were administered the MPI again. Within two months of treatment completion, the attending psychologist completed a Treatment Compliance Rating Scale.

Data analyses

The factor score formulas obtained from the factor analysis by Cipher (1998; see formulas

above) were used to compute the scores that represented the two coping styles (predictors) in the current path model. These factors were first correlated with treatment compliance ratings and improvement in functional capacity. Path analysis was then conducted to obtain direct and indirect effects between the variables, allowance for error terms (e.g. measurement error) and an indication of overall 'fit' of these models. 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 the difference between the path coefficients and original (correlation) coefficients among the variables. The first path model, as illustrated in Fig. 1, shows treatment compliance/collaboration as the mediating variable between coping styles and treatment outcome. This mediational model was compared to a non-mediational model (Fig. 2), with Negative Emotional Expression, Aggression and Treatment Compliance as independent variables predicting Treatment Outcome. The Binomial Index of Model Fit (Fraas & Newman, 1994) was computed for each model in order to determine the fit between the data and the proposed models. Finally, the mediational model was statistically compared to the non-mediational model with a χ^2 test comparing numbers of significant paths in each model. This method is the recommended technique when comparing two non-nested models with equal degrees of freedom and/or the same number of

paths (Newman, personal communication, March 2001).

Results

Correlational analyses revealed Factor One (Negative Emotional Expression) to be positively related to compliance, whereas Factor Two (Aggression) was negatively related to compliance (Table 2). Compliance was positively related to reductions in functional impairment. However, correlations between compliance and the other variables may be underestimated due to the small variance associated with compliance (see Table 3). 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.

The fit indices for the mediational and non-mediational models of treatment outcome are shown in Table 4. The fit indices for the mediational model indicate a good model fit between the data and the model. The χ^2 was 1.49 ($p < .69$), meaning that the observed (original, S) and estimated (reproduced, Σ) correlation matrix did not significantly differ. Other goodness of fit indices, such as the GFI, AGFI and RMSEA, also were indicative of a good model fit. The non-mediational model, on the other hand, yielded a χ^2 of 10.82 ($p < .02$), with other indices of model fit also suggesting a poorer model fit (see Table 4).

The Binomial Index of Model Fit (Fraas &

Table 2. Correlations among treatment outcome variables (N = 61)

	<i>Improvement</i>	<i>Compliance</i>	<i>Negative EE</i>	<i>Aggression</i>
Improvement	1.00			
Compliance	-.28*	1.00		
Negative EE	-.06	.30*	1.00	
Aggression	-.06	-.33*	-.03	1.00

Notes: Negative EE = Negative Emotional Expression; * $p < .03$

Table 3. Means for treatment outcome variables

	<i>Mean</i>	<i>Standard deviation</i>
Negative Emotional Expression	.03	1.02
Aggression	.02	1.04
Compliance	3.70	.62
Interference (Improvement)	.00	1.08

Table 4. Model fit indices for mediational vs. non-mediational path models

Criterion	Mediational model value	Non-mediational model value	Acceptable level
Chi ² (d.f. = 3)	1.49, $p < .69$	10.82, $p < .02$	Non-significant Chi ² value
GFI (Goodness of fit)	.99	.92	0 (no fit) to 1 (perfect fit)
AGFI (Adjusted GFI)	.96	.74	0 (no fit) to 1 (perfect fit)
RMSEA (Root-mean-square error of approximation)	.000	.21	< .05
Binomial Index of Model Fit	.13	2.38	Lower values indicate better model fit

Newman, 1994) for the mediational model was .13, while the Binomial Index for the non-mediational model was 2.38. Low binomial indices of model fit indicate a good fit between the data and the model; high values indicate a poor fit (Fraas & Newman, 1994; Newman, Fraas, & Norfolk, 1995). The mediational model was found to have a substantially higher number (100%) of significant path coefficients (three paths versus one path; ($\chi^2 = 3.00, p < .08$; see Table 5). Therefore, the data appear to provide substantial support for the mediational model as opposed to the non-mediational model.

Discussion

These results strongly support a mediational model of treatment outcome in pain management. Compliance appears to be the link between coping/personality styles that patients possess when entering into treatment, and the improvement they have accomplished by the end of treatment. These findings are consistent with other studies using the MBHI as predictors of compliance in health-care settings (e.g. Tracy et al., 1987).

As for the specifics of coping style effects on treatment compliance, the results showed that the amplification of emotional distress leads to

less compliance with treatment, thus resulting in poorer outcome. The more emotionally controlled or balanced patients are, the more compliance they show, and in turn, the higher improvements they attain in functional capacity. The more aggressive and forceful in coping style, the less likely patients will comply with or benefit from treatment. This empirically validates the recent postulations of how anger and aggressiveness undermine therapeutic alliance and treatment compliance (Fernandez & Turk, 1995).

These findings are not intended to suggest that suppressing negative emotion is *functional*. Possessing defensive coping traits (e.g. being emotionally constrained/stable, unwillingness to admit problems) 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, Antoni, Kumar and Schneiderman (1990), those

Table 5. Path coefficients in the mediational vs. non-mediational model

Path	Mediational model	Non-mediational model
Negative EE → Compliance	$\beta = .29^*$	–
Aggression → Compliance	$\beta = -.27^*$	–
Compliance → Functional Impairment	$\beta = -.28^*$	$\beta = -.33^*$
Negative EE → Functional Impairment	–	$\beta = .04, NS$
Aggression → Functional Impairment	–	$\beta = -.15, NS$

Note: *Indicates significance at $\alpha = .05$

chronic pain patients who were repressors, 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) and poor lifting capacity among chronic pain patients (Burns, 2000). 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.

Negative Emotional Expression 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. In contrast, the most difficult patients are likely to be 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, they are also hostile, resentful and aggressive in their approach to treatment. These patients are likely to be refractory to treatment, or less likely to complete the treatment itself.

In conclusion, the mediational model suggests that high-risk dispositional factors, such as negative emotion and hostility, interfere with treatment outcome by way of their effect on therapeutic compliance. Recognizing these factors is essential for the effective screening and prognosis of patients in pain. It also alerts the clinician to important issues for the therapeutic agenda.

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