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Multi-modal examination of psychological and interpersonal distinctions among MPI coping clusters: A preliminary study

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Abstract

The Multidimensional Pain Inventory (MPI) is a widely used instrument to characterize distinct psychosocial subgroups of patients with chronic pain: Adaptive (AC), Dysfunctional (DYS), and Interpersonally Distressed (ID). To date, several questions remain about the validity and distinctiveness of the patient clusters and continued scientific attention has strongly been recommended. It is unclear if AC patients experience better adjustment or merely present themselves favorably. Moreover, differences in psychological distress and interpersonal relations between DYS and ID patients are equivocal. The present study is the first to utilize comprehensive informant ratings to extend prior validity research on the MPI. We employed a multi-modal methodology consisting of patient self-report, parallel informant ratings, and behavioral measures. Ninety-nine patients with chronic pain, their partners, and providers participated. They completed measures of patients' psychological distress and social relations. We also systematically observed patients' pain behavior. Results provided strong support for the validity of the AC cluster in that patients' positive adaptation was reliably corroborated by informants. The differentiating characteristics between the two maladaptive clusters, however, remain elusive. We found evidence that DYS patients' distress appeared to be illness-specific rather than generalized; however, both clusters were equally associated with social distress and partner caregiver burden.

Keywords

pain; interpersonal; coping; validity; adaptation; proxy; assessment

Introduction

It has been shown that the traditional biomedical approach is insufficient for understanding chronic pain.^{12,48} Many patients show poor treatment response despite diverse rehabilitation modalities. One conceptualization to explain this phenomenon is the long-held supposition of patient uniformity⁴⁷ that patients with chronic pain are a homogeneous group who benefit from the same therapeutic approach. In recent years, it is increasingly recognized that patients' pain experience is heterogeneous, and that treatment should be tailored to enhance efficacy.^{48,51} Thus, efforts to identify subgroups of patients with distinct psychosocial adjustment patterns have been underway.

One instrument that has successfully contributed to the elucidation of patient heterogeneity is the Multidimensional Pain Inventory (MPI).²⁸ The inventory yields three psychosocial coping clusters: Adaptive (AC) patients with low pain impact and high levels of functional activity; Dysfunctional (DYS) patients with high pain impact, affective distress, and severe functional limitations; Interpersonally Distressed (ID) patients with poor social support by their significant others in response to pain.⁵⁰ Numerous studies have provided support for the generalizability of these clusters across various chronic pain conditions.^{16,31,36}

To date, questions remain about the validity of the taxonomy. A recent review⁴⁷ recommended continued investigation to determine if AC patients do indeed experience better adjustment than DYS and ID, and if the two maladaptive clusters can be successfully distinguished from one another. Some research has questioned if AC patients do adjust positively or simply deny their problems.¹⁵ Studies have scrutinized this by examining if AC patients score differently on measures of social desirability and defensiveness compared to DYS and ID patients.^{11,30} Their results suggest that AC patients do not engage in a favorable reporting bias. Furthermore, the distinctiveness of the two maladaptive coping clusters regarding psychological distress has remained inconclusive.⁴⁷ Some evidence suggests that DYS patients score significantly higher on pain-catastrophizing⁵, pain-related anxiety³⁵, and fear of pain and activity⁴⁹ compared to ID patients, other studies report less distress in DYS patients^{2,16}, and still other research reports no differences between the two.¹⁵

It has recently been argued that focusing on the type of distress is important for distinguishing the two clusters.² DYS patients' distress may specifically pertain to their pain, whereas ID patients' distress should strongly relate to their interpersonal relationships. Global distress measures do not permit a precise investigation of this distinction. Instead, specific instruments measuring social support, interpersonal relationships, and pain-focused distress may be more sensitive. Moreover, behavioral assessments not based on self-report can provide an objective measure to differentiate the two clusters. Structured observations of pain behavior^{18,20} that have been shown to be associated with pain intensity²⁹ and distress²⁶ may be a fruitful avenue in this regard.

Another method to validate the MPI clusters is to assess the perceptions of patients' partners and health care providers. Such data has not been available to date. Distinctive patient characteristics consistent with the taxonomy that are recognized by individuals involved in the patient's life lend strong evidence for the validity and utility of these clusters.

This study involved patients' partners and providers (informants) who provided parallel ratings on a variety of measures. We also observed patients' pain behavior. We hypothesized AC patients would self-report less psychological distress, more favorable interpersonal relations and display less pain behavior compared to DYS and ID patients. Second, we hypothesized that the two maladaptive clusters would be differentiated by DYS patients scoring higher on a pain-specific measure of psychological distress and ID patients reporting more problematic interpersonal relations; we expected no difference on a global measure of psychological distress. Third, we hypothesized informant ratings would yield the same differentiations as evident in patient self-report.

Method

Participants

Recruitment was conducted through distribution of flyers at five pain management facilities. Eligibility criteria were: (a) 18 years of age or older, (b) diagnosis of low back pain, osteoarthritis, rheumatoid arthritis, and/or fibromyalgia, (c) planned regular visits at the treating facility (average frequency of visits had to be at least every 4–6 weeks in order to

complete all assessments within a close time frame), (d) ability to read, write, and speak English, and (e) no visual impairments that would interfere with questionnaire completion. Out of the 180 patients who were approached, 145 (81%) agreed to be screened. One hundred and twenty patients were eligible and consented to participate in the study. Of these, 17% ($n = 21$) withdrew shortly after enrollment. Reasons for withdrawal were upcoming health concerns ($n = 5$), personal matters ($n = 8$), and discontinuation of treatment at the facility ($n = 8$). The remaining 99 patients (83%) completed the study. No significant differences were found between completers and non-completers on demographic (i.e., age, gender, marital status, race, education) and medical characteristics (i.e., years since diagnosis, symptom duration).

Procedure

The study was reviewed and approved by the Stony Brook University Institutional Review Board. Patients gave written consent to participate in the study including collection of ratings from their partner and healthcare provider. At the time of study enrollment patients were asked to identify a person with whom they felt close (as outlined by the instructional set of the MPI) and who might be willing to participate as their study partner. These individuals could be spouses, significant others, family members, or close friends who communicated regularly with the patient. Patients were given a study flyer and invitation letter for their study partner. We also obtained patients' permission to call their designated partners within 1–2 days to inquire about their willingness to participate in the study. If a partner declined to participate, patients were still eligible to continue with the study. Approximately two weeks after enrollment, patients and, if applicable, their partners received questionnaire packages via mail to be completed at home. Both were instructed to complete the questionnaires in privacy and to not share the questions and their answers with one another to avoid non-independence of reporting. Approximately 2–3 weeks after questionnaire completion, patients met with the research staff at the doctor's office on the day of their routine appointment in order to complete the behavioral observation. Their providers completed an 11-item questionnaire on the same day (3 questions analyzed for this report). Detailed instructions were provided to patients in order to ensure standardization of the observational procedure, which was conducted and videotaped by a trained observer in a private area at the treating facility.

Measures

Patients and their partners provided basic demographic information including their age, gender, race, ethnicity, education, marital status, income, number of children, current occupation and disability status. They also completed several other assessment instruments described below.

Patient Measures

Multidimensional Pain Inventory²⁸—The 61-item patient version (version 2) assesses a range of psychosocial variables that are associated with the chronic pain experience. The first section assesses patients' pain severity, perceptions of pain-related interference, appraisals of the support received from significant others, perceived life control, and affective distress. The second section measures patients' perceptions of significant others' behavioral responses to their pain: punishing/negative responses, distracting responses, and solicitous responses. The third section assesses patients' general activity level. A modified version of the MPI instructional set that clarifies the meaning of "significant other" was used.³⁶ These instructions define "significant other" as someone whom the patient feels close to and who interacts with the patient on a regular basis; they have been found to minimize the percent of patients whose profiles cannot be classified into one of the three coping styles due to misunderstanding of the terminology.³² The MPI subscales have demonstrated good temporal stability ($r = .62 - .91$) and internal consistency (Cronbach's $\alpha = .70$ to $.90$).²⁸ The internal consistencies for the MPI subscales in the present sample were adequate (Cronbach's $\alpha = .77 - .95$).

The computer scoring system (MAP)⁴³ uses patients' ratings on the subscales to generate a classification of each patient into 1 of 3 adaptational styles (i.e., DYS, ID, AC). The program uses multivariate classification procedures and a goodness-of-fit approach to determine if an individual's MPI scale scores are sufficiently similar to any of the three prototypic profiles. If a patient endorses responses that do not show an adequate statistical fit to one of the three prototypes, the patient's case is determined Anomalous or Hybrid. Patients whose scores have received one of these labels are not members of distinct and internally consistent clusters. It has also been noted that a lack of understanding, reading difficulties, random responding, or an unusual pattern of responding could lead to an Anomalous profile.^{3,14,43} For these reasons, it has been argued that Anomalous and Hybrid do not render valid clinical information,¹⁰ and consistent with related literature they are excluded in the study analyses.^{3,14,35}

Seventy-six patients were classified into one of the three MPI clusters: Twenty-eight of the patients were classified as AC, 19 as DYS, and 29 as ID. The remaining patients were labeled Anomalous or Hybrid ($n = 23$, 23%) and were excluded from the analyses. These rates are comparable to those reported previously.⁴³ For the 76 analyzed patients, partner ratings were available for 20 AC patients, 14 DYS patients, and 20 ID patients. Provider ratings were available for 26 AC patients, 17 DYS patients, and 24 ID patients.

General Psychological Distress

Revised NEO Personality Inventory (NEO-PI-R)⁷: As a global measure of negative affect, patients completed the 49-item neuroticism scale of the NEO-PI-R. Reliability and validity are well-established.⁷ The neuroticism scale has demonstrated adequate temporal stability over a three-month period ($r = .83$) as well as good internal consistency (Cronbach's alpha = .92).⁷ The internal consistency in the present study was .92.

Pain-Specific Psychological Distress

Pain Catastrophizing⁴⁶: The PCS consists of 13 items that assess rumination, magnification, and feelings of helplessness in response to pain. The total PCS has been shown to have good internal consistency (Cronbach alpha = .91), which was replicated in the present study (Cronbach alpha total = .94). The temporal stability of the total PCS has been reported ($r = .70 - .78$) indicating good stability across a six-week period of time.⁴⁶

Interpersonal Relations

Dyadic Adjustment Scale (DAS)⁴⁵: The DAS is a widely-used 32-item questionnaire to assess relationship satisfaction in romantic couples. We administered this scale only to those patients and their corresponding study partners who were in a romantic relationship with one another. Adequate normative data exist, and reference ranges for scores that reflect normal and distressed relationships have been developed. Spanier (1976) reported supporting evidence for the instrument's criterion-related validity and satisfactory internal consistency (Cronbach's alpha = .96). In addition, the instrument has shown to have good temporal stability ($r = .87$). The internal consistency for patient-report on this scale was .97 in the present study.

Social Provisions Scale (SPS)⁸: General social support was measured using this 24-item measure that asks respondents to rate the extent to which they perceive various types of support available from their social network. The SPS has been widely used and has demonstrated good construct validity and reliability, with an overall alpha coefficient estimated at .92.⁸ The internal consistency for this scale in the present study was .93.

Pain Behavior

Behavioral Observation Method¹⁸: The BOM is an objective behavior sampling method developed by Keefe and Block (1982) for assessing patients' displays of pain behavior. Patients are directly observed and videotaped during a 10-minute standard situation that involves static (sitting, standing, reclining) and dynamic activities (pacing or shifting from one position to one another). Using a 20 second observe, 10 second record intervals recording system, pain behaviors are observed and systematically coded by trained observers. The behaviors coded include: guarding, bracing, rubbing, grimacing, and sighing. The overall score has been shown to be reliable and valid.¹⁸ Different protocols for scoring pain behavior with the Behavioral Observation Method (BOM) exist for various chronic pain conditions. Because the majority of the patients in the present study suffered from chronic low back pain, pain behavior scoring was conducted only for patients who indicated low back pain as their primary pain complaint ($n = 83$). The first author received training in the observation method at Duke University. A detailed observation manual²³ was followed. Prior to analyses, we calculated inter-rater reliability between the ratings of the first author and those conducted at Duke University in order to ensure reliability of coding. A total of 500 observational units were scored by the developers of the pain behavior protocol and compared to the results obtained by the first author of the present study. The percent agreement was 96% agreement for the total scale. These results meet the criteria for adequate inter-rater reliability noted by Keefe and colleagues (93% – 99%).²⁷ Moreover, Cohen's kappa, as a more stringent index of agreement, was calculated because it adjusts for agreement by chance. Cohen's kappa yielded .84 for the total scale, representing substantial agreement.

Partner Measures

Psychological Distress

Patient Catastrophizing: Each partner rated how much their patient-partner engaged in catastrophizing using three parallel catastrophizing items adapted from the patient version of the PCS. In order to obtain the best possible representation of the constructs underlying each subscale, items with the highest item-total correlations as reported for the original patient version were chosen and reworded to fit a partner format (rumination: “*My partner can't seem to keep the pain out of his/her mind*”; magnification: “*My partner seems overwhelmed by his/her pain*”; helplessness: “*My partner seems to become afraid that the pain may get worse*”). An overall catastrophizing score was computed from these three items with an internal consistency of .88.

Interpersonal Relations

Caregiver Strain Index (CSI)⁴¹: The CSI is a 13-item tool that measures strain related to care provision on several dimensions: employment-related, financial, physical, social and time-related strain. Positive responses to seven or more items on the index indicate a greater level of strain associated with care for patient's illness. Internal consistency of the CSI is high (Cronbach's alpha = .86) and construct validity is supported by correlations with the physical and emotional health of the caregiver and with subjective views of the care giving situation.⁴¹ The internal consistency for this scale in the present study was .86.

Dyadic Adjustment Scale (DAS)⁴⁵: In addition to the patient, romantic partners completed the DAS (described above). In the present study the internal consistency for partner-report was .96.

Provider Questionnaire

Healthcare Provider Questionnaire—Three items assessed providers' perception of patient catastrophizing and were identical to the ones completed by partners (rumination: “*My*

patient can't seem to keep the pain out of his/her mind"; magnification: *"My patient seems overwhelmed by his/her pain"*; helplessness: *"My patient seems to become afraid that the pain may get worse"*). An overall catastrophizing score was computed from these three items with an internal consistency of .92.

Analytic Strategy

All data were double-entered and checked for accuracy. Analyses were conducted using the Statistical Package for the Social Sciences (SPSS, Version 16). All participating patients, partners, and providers completed their respective MPI version. However, analyses only included patients with an AC, DYS, or ID coping style. The following strategies were used to compare mean differences across MPI patient clusters: (a) Cluster assignment was determined by the MAP scoring program and was based on patients' responses to the MPI patient version. Ratings on the outcome variables provided by patients, partners, and providers served as the dependent variables. (b) All research questions were tested via two planned contrasts in order to maximize the statistical power for the analyses and to minimize Type I error. The first one compared patients in the AC cluster against DYS and ID ($AC \neq DYS:ID$) to examine if these patients experience better adjustment. The second one compared DYS against ID patients ($DYS \neq ID$) in order to delineate specific differences between these two clusters. (c) Cohen's d , a common measure of effect size ($d = .20$ small, $d = .50$ medium, $d = .80$ large effect) is reported for the comparisons. It is defined as the difference between two means divided by their pooled standard deviation.⁶

Results

Participants

Patient Sample—The mean age of the present sample was 52 years ($SD = 11.9$). Forty-nine patients (50%) were female. The majority of patients was married or living with a partner (70%) and White (87%). Approximately 26% had completed college and an additional 33% had some college education. Patients identified their primary pain complaint as low back pain (84%), osteoarthritis (10%), rheumatoid arthritis (3%), and fibromyalgia (3%). Forty seven patients (47%) came from pain management clinics, and the other 52 patients (53%) came from physical therapy offices. As might be expected when patient characteristics were compared, patients from the pain clinics had pain longer (mean = 10.8 yrs., $SD = 8.7$ vs. mean = 7.1 yrs., $SD = 8.7$; $t(91) = 2.1$, $p < .05$) and experienced more disability (Means: 65 % vs. 35 %; $\chi^2(1) = 8.9$, $p < .01$) than patients from the physical therapy offices.

Out of the 83 patients with chronic low back pain, 50 patients (60%) completed the behavioral observation for low back pain. Reasons for not completing this assessment included (a) patients' only agreeing to complete the questionnaire battery at study enrollment due to time constraints ($n = 20$), (b) physical inability to complete the assessments (e.g., they were wheelchair-bound, carried oxygen-masks, had broken limbs, etc.) ($n = 6$), and (c) patients refusing to be videotaped primarily due to disability litigations ($n = 7$). Excluding this latter group of patients from the analyses, in general, did not change any results or conclusions.

Partner and Provider Sample—Out of the 99 patients, 15 (15%) did not volunteer a partner. Of the 84 volunteered partners, a total of 70 (83%) agreed to participate in the study. Most of the study partners (76%) were in a romantic relationship with the patient, and 24% were family or close friends. There were no significant differences between romantic and family/friends study partners on age, gender, race, and education. A total of nine healthcare providers (four medical doctors, four physical therapists, and one nurse practitioner) agreed to participate in the study and provided data for 87 patients (88%). The remaining 12 patients needed to cancel or reschedule their planned appointments at the treating facility, so that

provider assessments could not be conducted within the time frame of the study. The gender distribution of providers was 33% female ($n = 3$) and 67% male ($n = 6$).

Demographics by Patient MPI Cluster Assignment

Differences between AC, DYS, and ID patients on demographic variables were examined using univariate ANOVAs and Chi-Square analyses. Table 1 presents the demographic characteristics. The clusters did not differ on any of the variables (e.g., age, gender, marital status, education, employment) (all $ps > .10$).

Psychological Distress

Results can be found in Table 2. The sample size for patients was $n = 76$ (i.e., AC = 28, DYS = 19, ID = 29); the sample size for providers was $n = 67$ (i.e., AC = 26, DYS = 17, ID = 24); the sample size for partners was $n = 54$ (AC = 20, DYS = 14, ID = 20).

Neuroticism—AC patients reported significantly lower levels of neuroticism compared to the other two clusters ($t(73) = -4.11, p < .001, d = .98$). There was no difference in DYS and ID patient ratings of neuroticism ($p = .44, d = .23$).

Pain Catastrophizing—AC patients reported less pain-related catastrophizing compared to DYS and ID patients ($t(73) = -3.27, p = .002, d = .78$). This was corroborated by partners and providers. Both proxies rated AC patients lower on catastrophizing compared to DYS and ID patients ($p < .001, d = 1.34; p = .001, d = .84$, respectively).

Comparing DYS and ID patients on catastrophizing, DYS patients had the higher scores ($t(73) = 2.25, p < .05, d = .66$). Although the means went in the expected direction and the effect size was moderate ($d = .53$), the difference between DYS and ID patients' catastrophizing as reported by partners did not reach significance ($p = .14$). However, providers rated DYS patients' level of catastrophizing as significantly higher compared to ID ($t(64) = 2.35, p < .05, d = .75$).

Interpersonal Relations

Results can be found in Table 3. The sample size for patients was $n = 76$ (i.e., AC = 28, DYS = 19, ID = 29); the sample size for partners was $n = 54$ (AC = 20, DYS = 14, ID = 20). For the analyses on relationship satisfaction, the sample size is reduced because only those couples who were in a romantic relationship with one another were asked to complete this measure (partners: AC = 14, DYS = 13, ID = 17; patients: AC = 18, DYS = 15, ID = 25).

Partners' Caregiver Strain—Partners of AC patients reported less strain compared to partners of DYS and ID ($t(50) = -3.31, p = .002, d = .95$). No differences emerged between DYS and ID patients ($p = .43, d = .26$).

Relationship Satisfaction—AC patients reported more relationship satisfaction compared to DYS and ID patients ($t(43) = 3.1, p = .003, d = .88$). Partner ratings of relationship satisfaction corroborated this finding ($t(41) = 2.1, p < .05, d = .66$). The difference between DYS and ID patients did not reach statistical significance ($p = .19$). However, the means were in the expected direction and the effect size was moderate ($d = .43$). A similar result was evident for partner ratings ($p = .34, d = .35$).

General Social Support—AC patients rated their social network as more supportive compared to DYS and ID patients ($t(70) = 3.43, p = .001, d = .82$). The difference between DYS and ID patients did not reach statistical significance and the effect size was virtually zero ($p = .97, d = .01$).

Pain Behavior

The sample size for these analyses is reduced because they only include patients with low back pain as primary pain complaint. Behavioral observations were analyzed for 17 AC, 6 DYS and 12 ID patients with low back pain as primary pain complaint. AC patients displayed significantly less pain behavior compared to DYS and ID patients ($t(32) = -3.13$, $p = .004$, $d = 1.06$). There were no significant differences between DYS and ID patients ($p = .31$, $d = .51$).

Discussion

The present study examined the validity of the MPI patient classification system. Whereas previous validity research has frequently relied upon patient self-report measures, the present study utilized a comprehensive multi-modal methodology including behavioral measures, healthcare provider ratings, and partner assessments (see Table 4).

First, we consider the results regarding the validity of adaptive coping by AC patients. Turk and Rudy 50 originally described AC patients as “minimizers”, and it has been noted that the transparent items in the MPI may facilitate problem denial for patients who wish to present a false positive picture.⁴⁷ We found ample support that AC patients indeed fare better than DYS and ID patients and that their positive adaptation cannot be merely attributed to a favorable self-report bias. Our first line of evidence pertained to psychological distress. AC patients reported the least amount of pain-specific (i.e., pain catastrophizing) and general psychological distress (i.e., neuroticism); their level of neuroticism was comparable to the average non-medical population.⁷ Importantly, these results were corroborated by similar partner and provider ratings.

The second line of evidence pertained to interpersonal relations. Research on the MPI taxonomy has focused predominantly on the coping efforts of the patient. Little is known about the clusters within the context of their close relationships and how patients and their partners cope with the illness as a unit. Investigation of partner outcomes is important, since numerous studies have shown that chronic pain not only affects the patient but also permeates family life.^{22,32,33,38-40} Burden of care is often a central consequence for partners. They experience physical strain associated with taking over tasks and responsibilities³⁷; moreover, the patient's suffering poses a major psychological stressor for the partner.³⁹ Evidence suggests, however, that the impact of the patient's condition on the partner varies and that not all partners experience negative consequences. Our results corroborate this by showing that partners of AC patients reported the least amount of caregiver strain. Not all of the partners were in a romantic relationship with the patient; some were family members or close friends. When analyzed separately, the same pattern of caregiver strain was evident for either type of partner (romantic or platonic). For couples in a romantic relationship, both reported more marital relationship satisfaction.

Finally, we observed patients' pain behavior. Pain behaviors have emerged as a key construct in the behavioral formulations of chronic pain.²⁴ They are found to be positively associated with self-reported pain intensity²⁹, depression²⁶, decreased self efficacy⁴, and interpersonal constructs including increased solicitous partner responses.¹³ Pain behaviors have been incorporated into the evaluation of patients with chronic pain in rehabilitation clinics and pain management offices.²⁵ Previous MPI validity research examining pain behavior has yielded inconsistent results. Turk and Rudy⁵⁰ found that DYS patients display significantly more pain behavior than ID and AC patients. Carmody⁵, however, found no significant differences among the clusters. In the present study, AC patients displayed significantly lower levels of pain behavior than the maladaptive clusters.

In sum, our multi-modal assessments strongly suggest that the superior adjustment of AC patients cannot be solely attributed to their self-presentation in questionnaires or other self-report measures. Instead, it appears that their positive adaptation is valid in an interpersonally agreed upon way¹⁷.

Our next hypotheses pertained to the distinctiveness of DYS and ID patients. Bergstroem et al.² recently suggested that the distress of DYS patients may be circumscribed and specifically pertain to their pain. For ID patients, distress should more strongly relate to their problematic interpersonal relationships with close partners and also with their general social network.⁵⁰⁻⁵² As expected, we found no difference between DYS and ID patients on a global measure of psychological distress (i.e., neuroticism). Both reported elevated levels compared to the general population.⁷ However, consistent with prior research⁵, a pain-specific measure (catastrophizing) found DYS to be more distressed than ID on patient, provider and partner (trending) reports.

Our hypothesis that the ID patient cluster would show more distress on measures of interpersonal relations was not statistically supported. Although patients and partners scored lowest on marital relationship satisfaction, the comparison to DYS patients and their partners was not significant. Furthermore, patient ratings of general social support were almost identical for both clusters. With a rare exception⁵⁵, these findings are in contrast to previous research. Our sample sizes were small, and it is noteworthy that the standard deviations of ID patients' mean relationship satisfaction ratings were considerably larger than those of AC and DYS patients. These factors may have contributed to the non-significant findings and also suggest substantial variability in relationship satisfaction for ID patients. It has also been noted that additional MPI patient clusters may exist.⁴⁷ For example, a study examining psychosocial adaptation to spinal cord injury identified an "interpersonally-supported" MPI patient cluster.⁵⁴ It may be that the MPI ID patient cluster incorporates two different subgroups of patients: one subset for whom the social distress is limited to pain-related interactions and one for which the social distress is generalized. Specifically, it could be that some ID patients only report difficulties with their significant other when it comes to pain but are otherwise in a satisfying relationship. Future studies could benefit from observing patient-spouse interactions⁴⁴ in situations that are pain-specific (and therefore, more likely to be stressful) and in pain-unrelated situations.

Finally, no significant difference emerged between the DYS and ID clusters in the structured behavioral observations. DYS patients displayed more pain behavior, but the small *n*'s in these cells make the comparison unreliable.

This study has several limitations and strengths worth noting. In terms of strengths, our design allowed us to conduct an in-depth investigation of the MPI patient clusters using multimodal and complementary assessments. Comprehensive validating information from patients' partners and treating healthcare provider has, to date, been unavailable. This has limited conclusions about the extent to which the MPI captures patients' adaptation beyond self-report. Second, recruitment was successful at involving over 80% of patients in the recruitment sites, thus increasing the generalizability of our findings to chronic pain populations. Third, several constructs to distinguish the patient clusters were measured with validated instruments, allowing a focused probe of the validity of the hypothesized differences. Our findings on AC patients appear to be robust as the effect sizes were in the moderate to large range. An important limitation is our limited sample size, particularly for the DYS vs. ID comparisons, and may have contributed to the non-significant findings on some measures. Subsequent research should employ larger samples to examine the differentiating characteristics of these two maladaptive coping clusters in further detail and with adequate statistical power. In addition, the at-home procedure for questionnaire completion potentially reduced the independence of patient and

partner ratings. Finally, patient catastrophizing, an intrapsychic cognitive phenomenon, might be difficult for partners and providers to rate.

Directions for Future Research

The results of the present study have important clinical implications and support continued efforts to identify clinically-meaningful patient subgroups and the impact of patients' pain on their relationships. The ID classification is partly generated by the patient reporting on the MPI negative responses from their partner regarding their pain. Visual inspection of the means suggested that ID patients tend to struggle more in their marital relationships than DYS patients; these couples may not have found adaptive means of dealing together with the patient's pain experience. Thus, ID patients may be in particular need of treatment focus on improving the coping of patient and family. One fruitful avenue for intervention may be spouse-assisted treatment which has previously been found helpful in promoting self-efficacy and pain coping in patients with osteoarthritis.^{19,22,21,34} Components of spouse-assisted treatment that target couples skills²², such as communication and mutual goal setting might be particularly helpful for ID patients. DYS patients engage in more catastrophizing and perhaps more overt pain behavior. Both of these may also be a maladaptive means of interacting with the patient's social environment in order to solicit support. It is for these reasons that the partners of both ID and DYS patients report more caregiver strain. DYS patients may benefit from interventions that guide them toward decreasing pain catastrophizing not only using cognitive restructuring but also by learning more adaptive means of communicating their pain experience and desire for support. Finally, an important utility of the pain taxonomy may relate to attrition in pain rehabilitation programs. It is a major problem with reported dropout rates of up to 70%.⁵³ In light of the enormous healthcare costs, it is advocated that treatment should only be prescribed for those patients who are most likely to experience benefits.^{42,47} However, consistent predictors of attrition have not been determined.⁹ Some evidence suggests that ID and DYS patients are more likely to drop out of rehabilitation programs than AC patients.⁵ Identification of patients vulnerable to attrition would allow investigation of targeted interventions to address their treatment needs and satisfaction. These directions require further research to confirm the reliability of the clusters. Furthermore, the examination of constructs that differentiate the clusters has not been exhausted.

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Table 1
Means (SDs) and Percentages on Demographic Characteristics across MPI Patient Clusters

	Adaptive (AC)	Dysfunctional (DYS)	Interpersonally Distressed (ID)	<i>p</i>
	<i>n</i> = 28	<i>n</i> = 19	<i>n</i> = 29	
Age	56.3 (13.2)	53.7 (11.8)	50.5 (9.6)	.19
Gender (% Male)	60.7	47.4	48.3	.56
Education (%)				.28
≤ HS Graduate	28.6	27.8	57.1	
1–4 Years College	53.6	61.1	39.3	
Graduate Education	17.9	11.1	3.6	
Race (% White)	100	94.1	100	.21
Employed (%)	35.7	36.8	41.4	.74
Disabled (%)	42.9	47.4	58.6	.48
Income (%)				.48
< \$20,000	8.0	15.8	14.3	
\$20,000 – \$49,999	36.0	36.8	17.9	
> \$50,000	56.0	47.4	67.9	
Married (%)	60.7	63.2	79.3	.42
Years with Symptoms	7.5 (7.5)	10.3 (10.6)	8.9 (7.7)	.55
Years since Diagnosis	7.3 (7.6)	6.2 (7.6)	7.0 (5.8)	.88

Table 2

Mean Differences across MPI Patient Clusters on Psychological Distress

		Contrasts					
		Adaptive (AC)		Dysfunctional (DYS)		Interpersonally Distressed (ID)	
		M (SD)		M (SD)		M (SD)	

Table 3

Mean Differences across MPI Patient Clusters on Interpersonal Relations

		Contrasts								
		Adaptive (AC)	Dysfunctional (DYS)		Interpersonally Distressed (ID)		AC ≠ ID; DYS		DYS ≠ ID	
		M (SD)	M (SD)		M (SD)		p	d	p	d
Interpersonal Relations										
Caregiver Strain	Partner-report	2.68 (2.65)	6.52 (4.28)		5.55 (3.66)		<.01	.95	.43	.28
Relationship * Satisfaction	Patient-report	112. 89 (16.21)	101.53 (14.63)		92.40 (28.83)		<.01	.88	.20	.43
Social Support	Partner-report	112.50 (25.85)	102.08 (16.64)		94.59 (20.17)		<.05	.66	.34	.35
	Patient-report	3.38 (.32)	3.06 (.42)		3.07 (.53)		<.01	.82	.97	.02
Pain Behavior ⁺	Observer-report	7.12 (6.60)	18.50 (8.83)		14.17 (10.47)		<.01	1.06	.31	.51

Table 4

Summary of Cluster Comparisons

Adaptive vs. Dysfunctional/Interpersonally Distress	Dysfunctional vs. Interpersonally Distressed
<ul style="list-style-type: none"> • Less neuroticism • Less pain catastrophizing <ul style="list-style-type: none"> -patient -partner -provider • Less pain behavior • Less caregiver strain • More relationship satisfaction • More social support 	<ul style="list-style-type: none"> • More [*] pain catastrophizing <ul style="list-style-type: none"> -patient -provider • no difference on neuroticism • no difference on caregiver strain • no difference on perceived social support • no difference on marital satisfaction • no difference on pain behavior

^{*} *Note:* DYS>ID