

Assessing patients with chronic pain using the basic personality inventory as a complement to the multidimensional pain inventory

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HJ Burton, SA Kline, R Hargadon, BS Cooper, RD Shick, MC Ong-Lam.

Assessing patients with chronic pain using the basic personality inventory as a complement to the multidimensional pain inventory. *Pain Res Manage* 1999;4(3):121-129.

OBJECTIVE: To examine the utility of the Basic Personality Inventory (BPI) as a complementary tool to the Multidimensional Pain Inventory (MPI) for the evaluation of patients with chronic pain. It was hypothesized that patients labelled 'dysfunctional' on the MPI would exhibit the highest levels of psychological distress as indicated by scores on BPI, followed in order by those labelled 'interpersonally distressed', and those described as 'adaptive copers'. It was anticipated that this pattern would be independent of sex. In addition, validity of the BPI as a measure of psychological distress among patients with pain was examined using psychiatric diagnostic ratings as independent criteria.

METHODS: Three hundred and twenty-six patients with non-malignant chronic pain seeking admission to a private pain clinic, an inpatient treatment program or a short term, multidisciplinary outpatient chronic pain program completed both the MPI and the BPI at a single sitting as part of a routine assessment procedure. The majority of patients underwent psychiatric assessment which specified Diagnostic and Statistical Manual of Mental Disorders-III-R (DSM-III-R) or DSM-IV diagnosis. Psychiatric diagnosis was determined for a subsample of 110 patients in the present investigation by conducting a random chart review.

RESULTS: The MPI patients classified as 'dysfunctional' manifested significantly higher levels of BPI measured psychopathology

than both 'interpersonally distressed' and 'adaptive copers' groups. 'Adaptive copers' reported the lowest levels of psychological dysfunction while those labelled 'interpersonally distressed' exhibited intermediate levels of dysfunction. Individuals with high levels of emotional distress as determined from the BPI were more likely to have an axis 1 disorder.

CONCLUSIONS: The BPI is an accepted valid and reliable generic measure of emotional well-being and may be used as a complementary index to the disease-specific MPI in assessing chronic pain patients. A psychometric assessment battery consisting of the MPI and BPI can assist both clinicians and researchers in identifying problem areas that may impede treatment of patients with chronic pain and in assessing treatment outcomes.

Key Words: *Basic Personality Inventory; Chronic pain; Multidimensional assessment of pain; Multidimensional pain inventory*

Évaluation des patients souffrant de douleur chronique à l'aide de l'Inventaire de la personnalité fondamentale en complément de l'Inventaire de la douleur multidimensionnelle

OBJECTIF : Examiner l'utilité de l'Inventaire de la personnalité fondamentale (IPF) utilisé en complément de l'Inventaire de la douleur multidimensionnelle (IDM) pour évaluer les patients souffrant de douleur chronique. On a émis l'hypothèse que les patients classés comme « dysfonctionnels » à l'IDM présenteraient les niveaux les plus élevés de

voir page suivante

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Received for publication April 28, 1998. Accepted June 23, 1999

détresse psychologique tel qu'indiqué par leurs scores à l'IPF, suivis de ceux présentant des « troubles de la personnalité » et de ceux décrits comme individus « s'adaptant aux situations ». On s'attendait à ce que ce schéma soit indépendant du sexe des individus étudiés. De plus, la validité de l'IPF comme mesure de la détresse psychologique chez les patients, a été testée à l'aide des échelles diagnostiques utilisées en psychiatrie, comme critères indépendants.

MÉTHODES : Trois cent vingt-six patients atteints de douleur chronique non cancéreuse désirant être hospitalisés dans une clinique privée de la douleur, dans un programme de traitement de la douleur basé à l'hôpital ou dans un programme ambulatoire et multidisciplinaire de traitement à court terme de la douleur chronique ont complété l'IDM et l'IPF en une seule fois comme partie intégrante d'un processus d'évaluation systématique. La majorité des patients ont subi un examen psychiatrique qui spécifiait le diagnostic du DSM-III-R (*Diagnostic and Statistical Manual of Mental Disorders-III-R*) ou DSM-IV. Dans la présente étude, le diagnostic psychiatrique a été déterminé pour un sous-échantillon de 110 patients en procédant à un examen randomisé des dossiers.

RÉSULTATS : Les patients évalués avec l'IDM et classés comme « dysfonctionnels » ont manifesté des niveaux de psychopathologie mesurés par l'IPF nettement plus élevés que ceux atteints de « troubles de la personnalité » et que le groupe des individus « s'adaptant aux situations ». Ce dernier groupe a rapporté les niveaux les moins élevés de dysfonction psychologique tandis que le groupe des individus atteints de « troubles de la personnalité » ont rapporté des niveaux intermédiaires de dysfonction. Les individus accusant des niveaux élevés de détresse psychologique telle que déterminée par l'IPF étaient plus exposés à un trouble de l'axe I.

CONCLUSIONS : L'Inventaire de la personnalité fondamentale est un outil de mesure générique dont la fiabilité et la validité sont confirmées pour mesurer le bien-être émotionnel et qui peut servir d'outil complémentaire à l'IDM spécifique à une maladie pour évaluer les patients atteints de douleur chronique. Une batterie de tests psychométriques comprenant l'IDM et l'IPF peut à la fois aider les cliniciens et les chercheurs à identifier des zones à problèmes qui nuisent au traitement des patients atteints de douleur chronique, et à évaluer les résultats des traitements.

Chronic pain is a demoralizing experience that compromises all aspects of an individual's life (1). The preferred approach to treating this debilitating syndrome is multimodal and multidisciplinary (2-4), necessitating a comprehensive assessment process that taps medical, psychological and social-behavioural parameters. Rather than using a single diverse-domain scale, we believe that the simultaneous use of varied assessment inventories may be more beneficial, as was reasoned by Berner and colleagues (5) in their advocacy of a polydiagnostic approach to multiple pain classifications. The problem lies in choosing complementary measures from among the plethora of disease specific and generic instruments available.

The disease-specific instrument we promote is the West Haven-Yale Multidimensional Pain Inventory (WHYMPI) (6). It captures the complex and elusive phenomenon of pain, computes domains relevant to the chronic pain experience, incorporates chronic pain norms and resolves the issue of pain classification in a nontraditional way (7). Through empirical integration of Multidimensional Pain Inventory (MPI) scores, a Multiaxial Assessment of Pain taxonomy (MAP) is generated (8,9) whereby each chronic pain patient is classified as 'dysfunctional', 'interpersonally distressed' or 'adaptive copier'. The MPI is a well known, often cited, reliable and valid measurement tool that is frequently used in pain assessments. However, its usefulness as a discriminative tool for measuring emotional well-being is limited. Aside from the affective distress subscale that taps mood, irritability and tension, the MPI fails to capture clinically important psychological disturbances such as depression, anxiety, and feelings of poor self worth, which are prevalent in a chronic pain population (10). This paper proposes the Basic Personality Inventory (BPI) (11) as a viable measure to complement the MPI in a pain assessment battery. We suggest that the ability of the BPI to discriminate meaningfully among the MPI pain prototypes would give credence to the use of the BPI as a supplementary psychological index and provide further evidence for the generalizability and utility of the MAP classification system. The BPI already has had a successful history in classifying individuals into subgroups other than those with

chronic pain (12-15), and has been used in pain populations with promising results (16,17).

Because the utility of our findings is predicated on the validity of the MPI subscales to correctly classify patients into Turk's (7) multivariate pain profile classifications, we wanted to reassert the validity of this taxonomy. Thus, we hypothesized that the success rate of predicting group membership of our patient population into the three major prototypic pain categories would be extremely high, that is, greater than 85%. We also tested the validity of the BPI by using psychiatric diagnostic ratings as an independent criterion. It was hypothesized that there would be a significantly high (ie, 70%) success rate for predictions of membership into a dichotomized Diagnostic and Statistical Manual of Mental Disorders (DSM) -III-R or DSM-IV primary diagnosis group (presence and absence of axis I diagnosis) using the BPI scales of depression, anxiety, self-depreciation, social introversion and hypochondriasis as discriminating variables. To test the utility of the BPI as a complementary assessment tool to the MPI, we hypothesized that patients labelled 'dysfunctional' would have the highest BPI scores followed by those labelled 'interpersonally distressed' and finally those labelled 'adaptive copier'. Although the BPI uses sex-sensitive norms, we hypothesized that the expected MPI pattern of dysfunctional, greater than interpersonally distressed, greater than adaptive copier would be independent of sex.

PATIENTS AND METHODS

Sample and procedure

The sample comprised 326 nonmalignant chronic pain patients, who were being assessed for treatment in pain programs located at and/or associated with St Paul's Hospital, Vancouver, British Columbia. Following consent for treatment of chronic pain, the subjects completed the MPI and the BPI at a single sitting. In the majority of cases, a psychiatric diagnosis was part of the assessment procedure. Patients were informed that they could refuse to complete the questionnaires at any time or refuse to answer any question in the test battery without affecting their treatment.

Seventy-eight subjects were eliminated from the analysis.

Fifteen were dropped because they received an anomalous MPI profile that occurs when MPI scale scores do not fit with established theory. This could be due to a number of reasons, including response faking, an inability of the respondent to comprehend the questions or random responding. Thirty patients were removed because of incomplete MPI data. Another 33 respondents were not included in the analysis because they did not have a distinct MPI prototypic pain type.

The 248 patients used in the final analysis consisted of 164 subjects from a short term, multidisciplinary outpatient chronic pain program, 61 subjects from the private pain clinic of one of the investigators and 23 in-hospital pain patients. The patients had a mean age of 43.56 years (SD 11.5), and an average pain duration of 8.01 years (SD 7.2 years). The mean age of the 186 women was 43.16 (SD 11.5) and the mean pain duration was 8.05 years (SD 6.8 years). The sample of 62 men had a mean age of 44.7 years (SD 11.1) and on average had experienced chronic pain for 7.9 years (SD 8.3 years).

Classification of pain was based on the International Association for the Study of Pain (IASP) criteria (18) and was determined at the time of the patient's assessment by an internist who specializes in the treatment of chronic pain. Patients were classified as having fibromyalgia based on the American Rheumatology Association criteria (19). Data on the IASP classification were missing for eight patients (3.2%). The largest groups of patients manifested symptoms of fibromyalgia (27.1%), followed by those with pain in the head, face and mouth (25.4%), lower back (13.3%), upper shoulders and limbs (7.5%), cervical region (7.1%), lower limbs (6.3%), thoracic region (5.4%) and the abdominal area (3.8%). Slightly over 4% of the patients were diagnosed with pain in the anal, perineal, genital and pelvic regions.

Measures

Basic Personality Inventory: The BPI (11) is a 12-scale, 240-item true/false personality assessment inventory designed to measure relatively separate components of psychopathology similar to those underlying the Minnesota Multiphasic Personality Inventory (MMPI) (20), but with fewer items. The scales were developed in accordance with modern standards for personality construction. This valid and reliable inventory focuses on measuring constructs of psychopathology rather than empirically derived predictors. In constructing the scales, attention was directed toward the readability levels of items. The role of the evaluative response bias was suppressed in item selection. There was no item overlap between clinical scales, and objectionable content was minimized (20).

For the present study, only scales thought to tap personality patterns and emotional distress that may be related to the chronic pain experience were used in the analysis, namely, anxiety, denial, depression, hypochondriasis, self-depreciation and social isolation. The choice of these six standard clinical BPI subscales was guided by previous research in which the BPI was used with a chronic pain population (21) and by reference to studies examining the psychiatric characteristics of chronic pain patients (22-24).

Each BPI scale has 20 items (10 true keyed and 10 false

keyed), and the inventory takes approximately 15 mins to complete. The psychometric properties are sound with regard to both its reliability (internal consistency, test-retest stability, item factor structure, desirability scale values) (25-28) and its validity (convergent, discriminant) (11,29-31) as established across several populations (12,15,32,33). Higher scores on the BPI indicate higher levels of psychopathology. Significant emotional distress, and need for clinical intervention, are indicated by standard *t* scores at or above 70 (ie, 2 SD above the mean).

West Haven-Yale Multidimensional Pain Inventory: The WHYMPI (6) is a psychometrically reliable and valid inventory built on the premise that chronic pain is a complex, subjective phenomenon. It contains 61 self-report items, divided into 12 scales configured around three axes. The psychosocial domains of pain severity (PS scale), pain interference (I scale), support (S scale), life control (LC scale) and affective distress (AD scale) are contained in axis 1. Axis 2 has three behavioural responses related to the patient's perceptions of how their spouse or significant other reacts to their pain, namely by punishing (PR scale), distracting (DR scale) or solicitous (SR scale) responses. An activity checklist including household chores, activities away from the home, social activities and outdoor work formulate axis 3. Patients rated the frequency in which they engaged in these activities. The four primary activity scales create a single scale of general activity (GA scale). The WHYMPI can be completed in less than 10 mins with patients endorsing the relevance of the psychosocial, behavioural or activities of daily living items on a six-point scale.

Through cluster analysis, three distinct patient profiles (adaptive copier, dysfunctional, interpersonally distressed) explain the factor structure of the MPI scores. If the patient's set of scale scores fell into more than one of the prototypic profiles, they were classified as one of three 'hybrid' types (ie, hybrid dysfunctional, hybrid interpersonally distressed or hybrid adaptive copier). A dysfunctional profile is consistent with a person suffering from severe pain in a broad range of their functioning, as well as exhibiting high levels of affective distress, and low levels of personal control and activity levels. The interpersonally distressed profile varies from the other two profiles in its marked differences on significant other support and behavioural response scales (S, PR, SR and DR scales). High levels of personal control and daily activity, and lower levels of pain severity, perceived interference and affective distress characterize an adaptive copier profile.

Clinical ratings: A psychiatric assessment by one of the investigators was undertaken before the administration of the BPI and MPI questionnaires. This assessment entailed a clinical interview and provision of an axis I, DSM-III-R or DSM-IV diagnosis. Axis I disorders included mood, anxiety and somatoform disorders. Diagnostic information was collected by medical chart audit on a random sample of 110 subjects by the senior author.

Analysis

Discriminant analysis was used to verify the correctness of patient classification into the prototypic MPI pain types (34). Included in the discriminant analysis were the nine MPI variables

TABLE 1
Predictions of Multidimensional Pain Inventory group membership using discriminative analysis*

Actual group	Predicted group membership					
	Dysfunctional		Interpersonally distressed		Adaptive copers	
	Female	Male	Female	Male	Female	Male
Dysfunctional	87.9% (58)	94.7% (18)	1.5% (3)	0% (0)	10.6% (7)	5.3% (1)
Interpersonally distressed	6.9% (5)	0% (0)	0.3% (65)	77.3% (17)	2.8% (2)	22.7% (5)
Adaptive copers	4.3% (2)	10% (2)	2.2% (1)	0% (0)	93.5% (43)	90% (18)

Percentage of female 'grouped' patients correctly classified = 90.2%; Percentage of male 'grouped' patients correctly classified = 86.9%. *The total number of patients must exceed the number of discriminating variables by more than two

that went into generating the multivariate profile statistics for determining the MPI patient classification scales (the general activity scale substituted for the four primary activity scales).

The validity of the BPI was tested using the psychiatric diagnosis as the independent criterion and BPI scale groupings as discriminating variables. Respondents were classified into one of two groups based on their DSM diagnosis: those with an axis 1 disorder and those with no axis 1 disorder. As for the discriminating BPI variables, subjects were dichotomized as having or not having clinically significant psychological distress based on a *t* score of greater than or equal to 70 on two or more of the BPI scales. This criterion was chosen so as to minimize the risk of false positives resulting from somatic items that are part of the hypochondriasis scale. Additionally, it maximizes the chance of identifying more severe levels of emotional distress. The use of a two-point scale for consideration of therapeutic intervention is clinically sound and is preferable to a single elevated scale (35). It is also common practice when clinicians interpret MMPI profiles (36). Discriminant analysis was used to establish the success rate of the BPI scale groups being correctly classified into the axis 1 and no axis 1 groups. analysis was used to establish the relationship between the clinical rating by a psychiatrist and those classified by the BPI measure as having major emotional distress.

A third set of analyses was designed to determine whether the BPI scales displayed significant scale score differences across the three MAP patient groups as a whole and then by sex. The inability to detect group differences on at least some of the BPI scale scores would raise concerns about the instrument's discriminant validity relative to a chronic pain population. Multivariate ANOVA (MANOVA) established the significance of the overall between group differences on the BPI. One-way ANOVA investigated differences among the individual BPI scales for the three MPI classifications. The 0.05 probability level was accepted as significant based on the Student-Newman-Keuls multiple comparison procedure. Because there are sex differences in response to the BPI, the sex-appropriate BPI norms were used in this analysis (11).

RESULTS

To determine whether this sample was representative of a pain population on which the MPI was normed, the 33 MPI hybrid types were included in the descriptive analysis. The data show that 88.3% of the 281 subjects belonged to one of the three em-

pirically derived MPI prototypic profiles. Eighty-seven respondents (31.0%) were profiled as dysfunctional, 94 (33.5%) as interpersonally distressed and 67 (23.8%) as adaptive copers. Thirty-three subjects had nonprototypic profiles. Six (2.1%) fell into the hybrid-coper classification, 17 (6%) were hybrid-dysfunctional and 10 (3.6%) were hybrid-interpersonally distressed. This breakdown is comparable with data provided by the Multiaxial Assessment of Pain Computer Program User's Manual v2.1 and from material provided by Turk (37).

Discriminative power of the MAP pain classification system

The results of the discriminant analysis that tested the power of the MPI to predict pain prototypic types accurately are presented in Table 1. Overall, it shows that the adaptive copers of both sexes were the most accurately classified prototype. Almost 94% of the women and 90% of the men were classified correctly. Slightly more than 90% of the women labelled 'interpersonally distressed' were correctly classified compared with 77.3% for men. There were also highly accurate distributions for patients considered dysfunctional. Slightly more than 87% of the female respondents were correctly classified, as were 95% of the male subjects. Thus, the overall success rate of 'grouped' subjects correctly classified ranged from 86.9% for men to 90.2% for women. When the respondent's sex is not considered, the overall success rate correctly classified is 89.8%. Disregarding sex in the discriminant analysis reveals that the adaptive copers group is the most accurately classified, with 92.4% correctly identified, followed by the dysfunctional group with 89.4% and the interpersonally distressed group with 88.3%. The prediction of a 85% success rate of correctly classifying group membership into three major prototypic pain categories was proven correct.

Discriminant ability of the BPI based on clinical ratings

Seventy-seven (70%) subjects had an axis 1 disorder according to DSM-III-R or DSM-IV diagnosis criteria. Thirty-three (30%) of these subjects were not diagnosed with an axis 1 disorder. Based on the criteria of having two elevated BPI scores, 51 (46%) of the audit respondents were considered emotionally distressed and 59 (54%) were considered not to be significantly emotionally distressed.

Table 2 shows that the discriminating BPI variables were more successful in predicting group membership in respondents with no axis 1 disorder. These patients were correctly classified with an 87.9% accuracy. On the other hand, 62.3% of those in the axis 1 disorder were correctly classified. The overall success

TABLE 2
Predicting Diagnostic and Statistical Manual of Mental Disorders (DSM)-III-R/DSM-IV group membership from Basic Personality Index variables using discriminative analysis

Actual group	n	Predicted group membership	
		Axis 1 diagnosis	No axis 1 diagnosis
Axis 1	77	62.3% (48)	37.7% (29)
No axis 1	33	12.1% (4)	87.9% (29)

Percentage of no axis 1 subjects correctly classified = 87.9%; Percentage of axis 1 subjects correctly classified = 62.3%; Overall percentage of 'grouped' subjects correctly classified = 70%

rate of the BPI to correctly classify 'grouped' cases was 70%. The phi coefficient on the cross-tabulation reveals a significant relationship between the clinical ratings and those classified as emotionally distressed. Individuals with major emotional distress as determined from the BPI are more likely to have an axis 1 disorder ($\phi = 0.40$ $P < 0.0001$).

BPI scale score differences across MAP patient groups

A MANOVA with the BPI scale scores as the dependent variables and the MAP patient classification as the independent variable was computed to determine the BPIs sensitivity to differences across the prototypic profiles. The MANOVA revealed a significant main effect ($F_{12,482} = 7.15$, $P < 0.0001$). Univariate F tests show significant mean differences in patient profile classification on the BPI scales of anxiety ($F_{2,245} = 10.39$, $P < 0.0001$), depression ($F_{2,245} = 29.45$, $P < 0.0001$), hypochondriasis ($F_{2,245} = 18.60$, $P < 0.0001$), self-depreciation ($F_{2,245} = 15.27$, $P < 0.0001$), social introversion ($F_{2,245} = 3.26$, $P < 0.04$) and denial ($F_{2,245} = 3.80$, $P < 0.02$).

Figure 1 shows the calculated BPI scale means as standard t scores for each of the MAP patient prototypic profile classifications. The raw scores were transformed into the metric of t scores with a mean of 50 and a standard deviation of 10. Post hoc analysis employing the Student-Newman-Kuels multiple comparison procedure indicated the discriminant validity of the BPI relative to the MAP classification prototypes. Overall, the data reveal that the dysfunctional group had the highest scores of any group and the adaptive copers had the lowest scores, with the exception of the BPI scale denial. This pattern of dysfunctional, greater than interpersonally distressed, greater than adaptive copers was more evident on the BPI scales of depression, hypochondriasis, anxiety and self-depreciation ($P < 0.05$). It was less so on the BPI scales measuring social introversion and denial.

The adaptive copers group had significantly lower social introversion scores than the dysfunctional group ($P < 0.05$). This indicates that subjects classified as adaptive copers were less isolated and more socially involved. Individuals classified as dysfunctional appear to have more of a tendency to avoid people. There was no significant difference in social introversion between the interpersonally distressed and adaptive copers groups, or between the dysfunctional and interpersonally distressed groups.

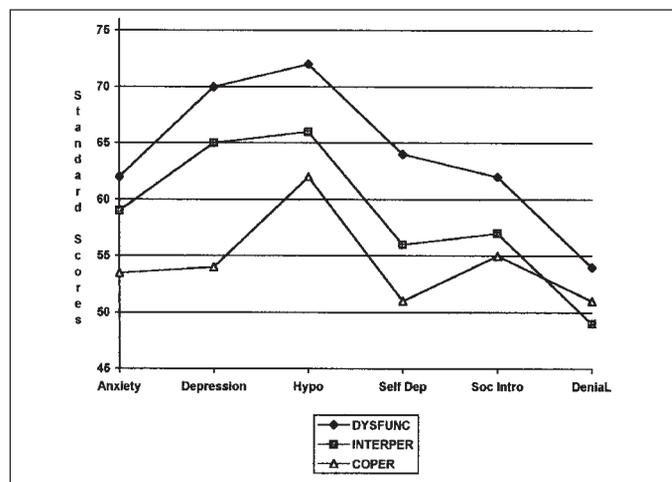


Figure 1 Multidimensional pain inventory classification by Basic Personality Inventory clinical scale means. Copers Adaptive copers; Dysfunc Dysfunctional; Hypo Hypochondriac; Interper Interpersonally distressed; Self Dep Self-depreciation; Soc Intro Social introversion

As for the BPI denial scale, there was no significant difference of scores between the dysfunctional and adaptive copers groups. However, the pattern of the data indicates that patients in the dysfunctional group tend to use denial more often. An individual with a high denial score is relatively unresponsive emotionally, lacks insight into feelings and other causes of their own behaviour, and fears discussing unpleasant topics. There was a significant mean difference between the dysfunctional and the interpersonally distressed groups ($p < 0.02$). Patients in the interpersonally distressed group use denial much less than those classified as dysfunctional. Their mean scores were also lower than those of adaptive copers. The low denial scores indicate that such individuals avoid impression management, accept feelings as part of themselves and can answer questions about themselves freely.

BPI scale score differences within MAP female patient sex groups

The BPI mean scores by MPI classification for female patients are shown in Figure 2. Multivariate analysis showed a significant main effect on the BPI scales for the 186 females ($F_{12,358} = 4.97$, $P < 0.0001$). Univariate F tests indicated significant mean differences in patient profile classification on the BPI scales of anxiety ($F_{2,183} = 5.01$, $P < 0.008$), depression ($F_{2,183} = 23.14$, $P < 0.0001$), hypochondriasis ($F_{2,183} = 10.14$, $P < 0.0001$), self-depreciation ($F_{2,183} = 11.59$, $P < 0.0001$), and social introversion ($F_{2,183} = 3.35$, $P < 0.04$). Denial approached but did not reach statistical significance ($F_{2,183} = 2.40$, $P < 0.09$). The directional pattern shown in Figure 2 is similar to that shown in Figure 1.

The dysfunctional group is significantly distinct from the adaptive copers group on the BPI scales of anxiety, depression, hypochondriasis, self-depreciation and social introversion ($P < 0.05$). Compared with the interpersonally distressed group, the dysfunctional group was significantly more depressed and self-depreciating ($P < 0.05$). There was no significant difference on the scales of denial, social introversion, anxiety and hypo-

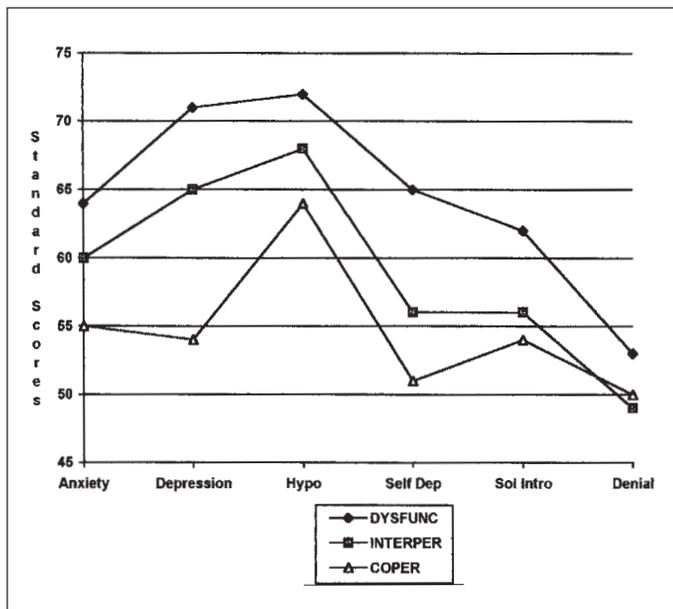


Figure 2) Multidimensional pain classification by female Basic Personality Inventory clinical scale means. Coper Adaptive copers; Dysfunc Dysfunctional; Hypo Hypochondriac; Interper Interpersonally distressed; Self Dep Self-depreciation; Soc Intro Social Introversion

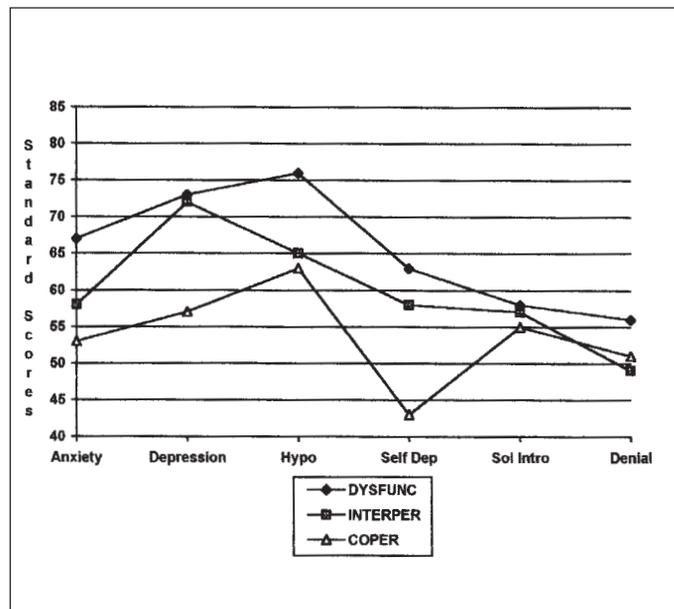


Figure 3) Multidimensional pain classification by male Basic Personality Inventory clinical scale means. Coper Adaptive copers; Dysfunc Dysfunctional; Hypo Hypochondriac; Interper Interpersonally distressed; Self Dep Self-depreciation; Soc Intro Social Introversion

chondriasis, but the pattern was for the dysfunctional group to exhibit more disabled behaviour.

A comparison between adaptive copers and interpersonally distressed showed that the overall pattern was for lower mean scores in those classified as ‘copers’. There were significant differences on the anxiety, depression and hypochondriasis scales ($P < 0.05$). Although not significantly different, the trend on the self-depreciation and social introversion scales showed those in the adaptive copers group to have a better sense of self-worth and to be more outgoing in their social interactions.

BPI scale score differences within MAP male patient sex groups

Figure 3 shows the BPI means on the MPI classification for men. MANOVA on 62 male patients showed a significant main effect among the six BPI scales ($F_{12,110}=3.75, P < 0.0001$). ANOVA reached statistical significance for the following scales: anxiety ($F_{2,59}=6.06, P < 0.004$); depression ($F_{2,59}=6.42, P < 0.003$); hypochondriasis ($F_{2,59}=11.22, P < 0.0001$); and self-depreciation ($F_{2,59}=3.23, P < 0.05$). There were no significant differences on the denial and social introversion scales.

The pattern of dysfunctional, greater than interpersonally distressed, greater than adaptive copers observed with women patients is still evident for the men. Adaptive copers exhibited significantly lower mean BPI scores than the dysfunctional group on scales of anxiety, depression, hypochondriasis and self depreciation ($P < 0.05$). Two of these scales (anxiety and hypochondriasis) also differentiated the dysfunctional and interpersonally distressed groups. The latter group had scores that were significantly lower ($P < 0.05$), indicating less psychopathology. Although not significant, the pattern was for the dysfunctional

group to have higher scores than the interpersonally distressed group on the BPI scales of hypochondriasis, self-depreciation and denial. There is no significant difference in the scores between copers and those classified as interpersonally distressed. The trend, however, was for those in the adaptive copers group to have lower scores on all the BPI scales except denial.

DISCUSSION

We undertook this study because we believed that the disease-specific MPI lacked a comprehensive appraisal of emotional well-being and should be used in conjunction with a generic psychological tool. Results of this investigation support the use of the BPI as a complementary tool for tapping emotional distress and personal strengths in a chronic pain population. Our findings affirm the discriminant validity of the BPI with respect to a pain population and reconfirm our previously reported findings as to the ability of the BPI to identify individual and group psychosocial differences among prototypical chronic pain groups based on the MPI (17). The consistency of our findings addresses some of the concerns expressed by Turk and Rudy (9) when they commented on the failings of generic traditional psychiatric instruments in the comprehensive assessment of chronic pain patients.

Our findings suggest that, overall, the elevations on at least two BPI scales were able to predict the presence or absence of axis I diagnosis made by a psychiatrist evaluating participants in the present study. However, it seems that the BPI results could more accurately predict absence, as opposed to presence, of significant emotional distress assessed by the psychiatrist. This pattern of results attests to the importance of not relying solely on psychometric findings to determine presence or absence of psychopathology in a clinical context. The results of the BPI, or any

other measure of psychological distress, should always be interpreted in the context of information gained during a clinical interview. Indeed, results of psychometric testing that are inconsistent with clinical interview information often raise important questions and hypotheses that can be pursued by the clinician before concluding the assessment.

The results also show that the BPI can differentiate among the major pain classification groups as determined by the MAP system using the MPI. Chronic pain patients classified as dysfunctional had more elevated BPI scores than those labelled interpersonally distressed. Furthermore, BPI scores for the adaptive copers were lower than both the dysfunctional and interpersonally distressed groups.

For the group as a whole, there was considerable elevation on the hypochondriasis, depression and anxiety scores. This finding is generally consistent with other chronic pain studies (38,39). In fact, much of the chronic pain research that uses the MMPI (40,41) testifies to the high prevalence of hypochondriasis, depression and hysteria in this population, and the ability of these scales to differentiate among the various groups suffering from prolonged pain (42,43).

In our study, the BPI scales of hypochondriasis, depression, anxiety, self-depreciation and social introversion were able to differentiate the MPI groups. This finding parallels that of Scudds et al (21). They report that BPI scores on the hypochondriasis, depression and anxiety scales could differentiate among fibrositis patients, normal individuals, and those suffering from rheumatoid arthritis. However, there was no differentiation among the groups with the denial and self depreciation scales. We found that self-depreciation and, to a lesser degree, denial, were able to differentiate among the MPI groups. The low denial scores obtained by the groups attest to the honesty of patients' responses and add credence to our findings and conclusions.

Our data generally supported the findings by Holden et al (30), and Smiley (44) as with the BPI being sex sensitive. They report that, compared to men, women score significantly higher on the BPI scales of hypochondriasis and anxiety. We also found that women have higher scores on these two scales across all three MPI groups. We did not find significantly higher scores in women than in men on the self-depreciation scale, as did Holden, nor did we find higher depression scores among women than among men, as did Smiley. However, men had higher denial scores than women in the interpersonally distressed group. Similarly, Smiley found that male delinquents had significantly higher denial scores than female delinquents.

We are recommending the BPI as a measure of emotional well-being for chronic pain patients; however, we should acknowledge that the MMPI and the MMPI-2 are the most extensively used psychometric tools in the field of chronic pain (41,45). Nonetheless, Rook et al (46), Main and Waddel (47), Smythe (48) and Merskey et al (49) have questioned their appropriateness in chronic pain assessment. They note that the MMPI and MMPI-2 are not sufficiently subtle to detect differences among pain patients, nor were they designed to tap psychopathology in individuals with that disorder. In fact, as Prokop (50) suggests, the profile of a chronic pain patient with an extremely elevated score on the MMPI hypochondriasis scale may yield

unwarranted conclusions because some of the items comprising the hypochondriasis subscale are likely to be physical symptoms of chronic pain (38,46). A high score may, therefore, primarily reflect an accurate description of symptoms or an increased awareness of bodily sensations. Smythe (48) had previously reported that the wording of the questions is such that a pain sufferer will almost invariably tend to score high not only on the MMPI hypochondriasis scale but also on the scales of depression and hysteria (ie, the 'neurotic triad').

The BPI also contains items referring to a variety of physical complaints and generalized malaise and weakness. However, in contrast to the MMPI and MMPI-2 versions, the BPI hypochondriasis scale contains a higher proportion of psychosomatic items distinct from health related concerns. Only six of the 20 BPI items may overlap with hypochondriasis.

To foster convergent and discriminant validity, Jackson (11), in his scale development of the BPI, sought to eliminate exemplars of traits that may overlap. Items were selected on the basis of their strong association with their targeted scale and their independence from other scales representing distinct constructs. For example, he tried to sharply distinguish the definition of the depression and hypochondriasis scales. On the basis of Beck's (51) findings that depression is often accompanied by somatic complaints, care was taken to avoid including items reporting somatic complaints on the BPI depression scale, thus avoiding both conceptual and statistical confusion with the hypochondriasis scale (11).

In contrast to the BPI, the MMPI test construction does not ensure independent dimensions of psychopathology (11). A response to one question may contribute to scores on more than one scale (21). Clark (52) noted that many of the MMPI-2's content scales measure more than a single symptom, content cluster or dimension. Furthermore, Dearnorff et al (53) identified extensive item overlap among the MMPI-2 scales and suggested that total scale scores may reflect various combinations of scale dimensions. It is suggested that future research compare the relative ability of the BPI and the MMPI to predict response to multidisciplinary pain management based on the assessment of psychopathology among chronic pain patients.

Because of the limitations of our current data set, we could not provide a clear answer to two important questions, both of which we will address with greater specificity at a future time. First, the small number of subjects in the private clinic, and especially in the inpatient treatment program, did not allow us to make a statistically meaningful comparison across treatment settings as to the consistency of the dysfunctional, greater than interpersonally distressed, greater than adaptive copers pattern. However, exploratory analysis of our data suggests that there is consistency. Second, we were hoping that our data set would allow us to explore sex differences in BPI and MPI profiles. This is particularly important for pain treatment and management in light of the growing body of evidence that suggests that differential health outcomes and perceptions are sex based (54-58). We reported that the pattern dysfunctional, greater than interpersonally distressed, greater than adaptive copers held true for the men and women when analyzed separately, but the data set did not allow us to test statistically for sex differences. We can

say that there was a tendency for women in the dysfunctional group to have higher scores on all the BPI scales and for individuals classified as interpersonally distressed or adaptive copers to have BPI scores within the normal range, regardless of sex.

CONCLUSIONS

The BPI merits consideration for psychological screening and assessment of pain patients, evaluation of pain programs and research. Based on its psychometric properties, prior research and the findings of this study of its discriminative power vis a vis the MPI, we suggest that it is a useful alternative to other psychological measures used in pain measurement. It is a good tool to use in conjunction with the MPI. It is of manageable length, easy to read, simple to administer and score, and is suitable for both paper and pencil, and computer administration. Unlike the MMPI, whose scale names suggest a particular psychiatric diagnosis, the BPI scale names capture the meaning of the underlying construct, and avoid pejorative diagnostic labels and the negativity associated with them. Based on a dimensional approach in its scale construction rather than an empirical strategy, it permits meaningful inferences to be made about score levels at any point along the scale, not just the point at which the scale score reaches some arbitrary level considered 'pathological'.

In conclusion, the BPI's ability to relate differences in dimensions of psychopathology to MPI pain types should assist clinicians and researchers in their task of evaluating differential outcomes in a chronic pain population. Moreover, it has potential to assist clinicians in identifying patterns of emotional distress and personality variables that may impede the course of treatment.

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