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THE BEHAVIORAL ASSESSMENT OF PAIN QUESTIONNAIRE: THE DEVELOPMENT AND VALIDATION OF A COMPREHENSIVE SELF-REPORT INSTRUMENT

Blake H. Tearnan, PhD
Michael J. Lewandowski, PhD

Abstract. *To date, most instruments employed in the assessment of chronic pain are empirically untested, psychometrically flawed, or are not comprehensive in nature. This paper describes the development and validation of the Behavioral Assessment of Pain Questionnaire (BAP), a comprehensive, self-report tool for the pain management clinician. Scales were developed to assess (i) physician influence, (ii) spousal influence, (iii) activity level, (iv) avoidance, (v) cognitive/beliefs, (vi) perceived consequences, (vii) mood, and (viii) coping. The present study showed the BAP to be a reliable, and valid clinical assessment instrument with greater than 95% of the scales/subscales showing high internal consistency. The BAP also correctly classified greater than 96% of the patients identified as highly dysfunctional by the Sickness Impact Profile.*

Descriptors. *chronic pain, comprehensive assessment of pain, pain, pain assessment, pain management*

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INTRODUCTION

Recent conceptualizations of pain recognize that pain can be influenced by a variety of factors. Mechanistic, singular-cause explanations are being replaced by ways of thinking that emphasize the interaction and synthesis of multiple causes. Many have argued that it is important to understand multifactorial health problems, such as pain, by examining the environmental, psychologic, and biologic causes and how these domains interact (1-4).

Numerous studies support the need to examine pain from this biopsychosocial framework (5). This is particularly evident in the area of chronic pain. It is well understood that the longer pain persists, the greater the likelihood that environmental and psychologic factors will play more prominent roles in the patient's pain problem (6). Depression, maladaptive beliefs about pain, strained interpersonal relationships, drug abuse, and maladaptive coping strategies usually do not develop until weeks or sometimes months after the onset and persistence of pain (7).

All of the measurement strategies that have been developed for assessing pain from a biopsychosocial perspective have been directed toward elucidating the problems of the chronic pain patient. Many of these attempts are comprehensive and noteworthy for effectively integrating medical and psychologic information (8-11). They represent the complexity of the pain experience better than more traditional measures (*e.g.*, McGill Pain Inventory) since a variety of factors important to chronic pain are assessed including physical activity, family functioning, organic status, mood, medication usage, and the impact of pain on the patient's quality of life. Unfortunately, most of the comprehensive instruments designed to assess chronic pain are empirically untested, psychometrically flawed, or lack the comprehensiveness needed to understand fully the chronic pain condition (12). There is a clear need for a psychometrically sound, comprehensive measurement tool for the assessment of chronic pain.

The purpose of the present study was to develop an assessment device, the Behavioral Assessment of Pain Questionnaire (BAP), that addresses the problems of earlier attempts

Blake H. Tearnan, PhD, is a clinician with Health-Plex, in Reno, Nevada. Michael J. Lewandowski, PhD, is Director of Behavioral Medicine at Excel Spine Rehabilitation Center of Reno, Nevada. Address reprint requests to: Dr. Blake H. Tearnan, Health-Plex, 5290 Neil Road, Reno, NV, 89502.

to assess chronic pain comprehensively. The main considerations were to include scales that measure important aspects of the chronic pain experience that have not been incorporated by other pain instruments. Scales were also developed to represent all 3 domains of the biopsychosocial model with an emphasis on the environmental and psychologic domains. In addition, the item content was constructed rationally by surveying the pain literature and interviewing several hundred chronic pain patients. To increase its utility, the instrument was designed as an extension of the clinical interview. The content of the scales represents areas of common clinical inquiry.

METHODOLOGY

Overview of psychometric design. Two separate phases of test development were conducted. In Phase One, the questionnaire was developed and then administered to several hundred chronic pain patients to examine its internal consistency and factor structure. Individual items that failed to load on the proposed factors or failed to meet acceptable levels of internal consistency were eliminated. Other items were rewritten to improve their clarity. The questionnaire was then readministered to a separate sample of 326 chronic pain patients. The BAP's factor structure and scale internal consistencies were then re-examined. Test-retest reliabilities and discriminant and concurrent validity studies were also evaluated.

Phase One: Subjects. The first phase was conducted on a sample of 307 chronic pain patients. The patients were all volunteers who were selected for participation if they had stable benign pain of at least 6 months duration, and they perceived their pain as significantly interfering with their activities of daily living. Subjects were screened for non-malignant pain by the authors or by the responsible individuals at participating clinics. Patients who were mailed the questionnaire directly were required to complete the questionnaire only if they had non-cancerous pain for at least 6 months. Subjects were recruited from consecutive referrals (n = 33) to a local outpatient treatment facility for chronic pain. In addition, former chronic pain patients (n = 128) from the same treatment facility were contacted by phone and asked to complete the questionnaire. Eighty-seven percent (n = 111) returned the questionnaire.

Subjects were also recruited from local physicians, chiropractors, and other pain clinics (n = 164). Thirty-four percent (n = 56) of the patients contacted returned the questionnaire. A final group of subjects (n = 281) consisted of members of a large national self-help group for chronic pain. These subjects were sent a shortened version of the BAP consisting of the demographic section and the Pain Beliefs Scale of the questionnaire. Thirty-eight percent (n = 107) of the 281 members contacted returned the questionnaire.

Sixty-five percent of the sample was female; the mean age was 44 years (SD = 12.22). The mean duration of chronic pain was 2.9 years. Chronicity ranged from 6 months to 36.4 years. The location of pain varied, with the largest group of patients (n = 205) reporting low back pain. The patients presented with varying pain syndromes such as myofascial, disc herniation, and reflex sympathetic dystrophy (RSD). Sixty-one percent reported being married and 18% divorced. Sixty-seven percent were unemployed. The patients rated their average pain severity as 3.9 on a 0-7 scale (0 = *no pain at all*, 7 = *excruciating pain*). They rated their worst pain as 5.25.

Procedure. Subjects were sent a questionnaire by mail or were given the BAP at the time of their initial evaluation. All subjects signed a consent form indicating their willingness to participate in the study.

Questionnaire development. Eight scales and numerous subscales were originally created to represent the biopsychosocial model of pain (see Table I). Also incorporated were several demographic variables such as age, sex, pain intensity, marital status, and ethnic origin. The scales were initially composed of 411 8-point Likert-type items. The anchor points were *Not at all* to *Very often* or *Strongly disagree* to *Strongly agree*. The scale content is discussed below; however, specific subscales are not mentioned.

- Activity Scale (Before pain and current). The Activity Scale measures the frequency of past and current levels of activity in order to determine if activity levels have changed since the onset of pain. Several areas of activities are assessed such as doing light or heavy household chores. An activity interference score is generated by examining the differences between prior and current levels of activity.
- Avoidance Scale. The Avoidance Scale assesses the degree to which patients avoid various activities because of pain.
- Beliefs Scale. This scale measures maladaptive beliefs about pain. Fears of re-injury, blaming oneself for not being able to control the pain, thoughts of entitlement, catastrophizing, lack of medical comprehensiveness, acceptance of pain, and blaming doctors are examples of item content.
- Negative Mood Scale. This scale was developed to detect the presence of depression and anxiety symptoms. Cognitive, behavioral, and physiological symptoms are represented. Examples include racing heart, restlessness, feeling tense and keyed-up, feelings of guilt, and decreased interest in socializing.
- Coping Scale. The Coping Scale was designed to measure patients' use of various behavioral and cognitive strategies for coping with pain. Asking others for help, hoping or wishing the pain will go away, and taking pain medications are typical strategies. Patients are instructed to imagine engaging in different activities including shopping for groceries, driving for long distances, and walking for long distances. They are required to rate how often they would use each strategy for coping with an increase in their pain while engaging in the activity. Strategies that emphasize both passive (*e.g.*, hoping and praying) and active (*e.g.*, stretching) methods of coping are included (13).
- Physician Influence Scale. The Physician Influence Scale was created to measure the impact that physician practices have on the behavior and attitudes of patients. Fordyce noted the

importance of examining physician behaviors as a source of influence on pain perception and impairment (6). Patients are instructed to rate, as a whole, all the clinicians who have evaluated and treated their pain problems. Examples of items on this scale include, "My physicians have become irritated with me because I did not improve with treatment" and "My physicians have encouraged me to exercise and become more physically active."

• Spouse/partner Influence Scale. This scale assesses patients' perceptions of the degree of reinforcement and punishment of both pain behaviors (*e.g.*, assuming certain jobs and responsibilities) and wellness behaviors (*e.g.*, warning not to engage in activity) by their spouses or partners.

Phase One results: Preliminary item analysis. A 10% item exclusion rule was utilized for all scales. If 90% or more of the sample answered the item with a 0 or 1, or a 6 or 7, the item was eliminated. This procedure was used for all scales except for the Activity Now Subscale in which a skewed response pattern was expected. Eighteen items were eliminated using this method.

Factor Analysis. The BAP items were factor analyzed using principal axes factoring followed by either oblique or orthogonal rotation depending on the factor correlation matrix. To maximize the variance of the squared factor loading, the principal axis factor solution was subjected to oblique rotation if the factor correlation matrix indicated the majority of inter-factor correlations were above 0.50. If the factor correlation matrix revealed that most of the correlations were 0.50 or below, an orthogonal rotation was performed. Individual items were selected for factor inclusion if they loaded greater than 0.30 on a factor and discriminated between factors by a value of more than 0.15.

Factor analysis generally supported the overall structure of the proposed scales and subscale content. Two of the Belief subscales merged (Depression and Catastrophizing), and a measure of weight change and muscular discomfort/somatic anxiety emerged from the Negative Mood subscales of Anxiety and Depression. An additional activity subscale emerged from the four originally proposed reflecting aspects of personal care (*e.g.*, sleeping and sexual activity).

Item analysis. Items remaining on each subscale were subjected to item analysis. Total scale scores were computed for those items retained from the factor analysis. Internal consistency was evaluated for each subscale using Cronbach's alpha.

The number of items in each subscale ranged from 2 to 16, and a given item never appeared in more than one scale. Most alpha coefficients were above 0.75 (see Table I).

Scale intercorrelations. Correlations between subscales ranged from 0.00 to 0.67. The majority of the values were low to moderate. Eight subscale intercorrelations were at a level above 0.50.

Readability level of the BAP. The Flesch Test (14) was

Table I. Summary information for originally proposed BAP scales (n = 307)

Scale	n	Mean[1]	SD	Reliability[2]
Physician Influence				
Discouragement of Pain (PDP)	4	2.48	1.82	.8175
Reinforcement of Wellness (PRW)	4	4.84	1.83	.7764
Discouragement of Wellness (PDW)	3	3.01	1.86	.7483
Reinforcement of Pain (PRP)	3	3.62	1.82	.6201
Spousal Influence				
Reinforcement of Pain (SRP)	8	4.66	1.66	.8821
Discouragement of Pain (SDP)	3	2.25	1.54	.8176
Reinforcement of Wellness (SRW)	5	4.51	1.60	.7729
Discouragement of Wellness (SDW)	3	3.65	1.94	.7287
Current Activity Level[3]				
Domestic/Household (CDH)	9	4.17	1.67	.8991
Heavy Activities (CH)	10	2.28	1.18	.8705
Social (CS)	6	2.95	1.14	.7117
Personal Care (CPC)	4	4.74	1.37	.5522
Avoidance				
Avoid Heavy (AVH)	16	4.52	1.90	.9358
Avoid Domestic (AVD)	6	3.20	1.96	.8879
Avoid Light (AVL)	8	2.18	1.47	.8180
Avoid Social (AVS)	3	3.15	1.95	.7367
Cognitive/Beliefs				
Depression/Catastrophizing (CATS)	10	3.30	1.79	.9220
Avoidance (AVOD)	3	4.51	1.91	.6925
Expectation for Improvement (EXP)	4	3.41	1.94	.7726
Blaming Self (BLMS)	4	3.64	1.47	.6267
Entitlement (ENT)	3	5.55	1.94	.7186
Blaming Doctors (BLMD)	5	3.10	1.52	.6522
Family Guilt (FAM)	3	4.94	2.10	.8151
Others (OTH)	2	2.46	1.83	.7439
Mood				
Depression (DEP)	12	3.37	1.73	.9298
Muscul Discomft/Somatic Anxiety (MS)	5	5.35	1.68	.7541
Anxiety (ANX)	3	2.63	1.64	.7119
Coping[4]				

[1] Scale scores were computed by summing all items. The mean was then computed based on the number of scale items.

[2] Internal-consistency reliability was estimated using Cronbach's alpha.

[3] The Activity Level Before Subscale was not analyzed since only current activity levels were considered relevant for factor analysis.

[4] The Coping Scale was not factor analyzed since the original scale format was nominal.

performed on the BAP to evaluate the readability of both the BAP instructions and the stimulus items. The mean Flesch readability score for the instructions was 69.0. This was in the "standard" range, that is, equivalent to reading a digest (*e.g., Reader's Digest*). The mean Flesch readability score for the BAP stimulus items was 70.0. This was in the "fairly easy" range, that is, equivalent to reading a science fiction novel. In terms of grade levels, the stimulus items had a 7th grade reading level; the instructions required an 8th to 9th grade reading level.

Subject critique. All subjects were asked to rate the BAP on several dimensions after completing the instrument. The results revealed that 95% of the subjects rated the instructions as very clear, 92% percent stated they were not bothered or offended by the content of the items, 89% felt the questionnaire would be useful for a better understanding of people who suffer from chronic pain, 64% felt the BAP was interesting, and 73% reported that the questionnaire was not excessively long. The average time for completion of the BAP was approximately one hour.

Phase Two: Revisions to the BAP. In addition to eliminating poorly written items and items that failed to meet the selection criteria from item and factor analysis, the Coping Scale of the BAP was changed from ordinal to interval scaling. A more extensive demographic section, as well as other background information, was included to measure such variables as caffeine, nicotine, and alcohol consumption, narcotic use, pain descriptors, pain behaviors, health care utilization, level of education, disability status, income, and employment status. A new scale, termed Perceived Consequences, was also added. This scale was developed to measure the negative expectations chronic pain patients sometimes report whenever their pain increases (6). Patients are required to rate the level of concern they have about different consequences occurring when their pain increases sharply. It was hypothesized that these appraisals might be related to decreased activity level, depression, or other variables (6). Five subscales were proposed: Social Interference, Physical Harm, Psychologic Harm, Pain Exacerbation, and Productivity Interference.

Subjects. The second phase of test construction was carried out on a separate sample (n = 326) of chronic pain patients using the same criteria as in Phase One. Subjects were recruited in one of two ways. The first group of subjects were consecutive referrals from an outpatient pain program in Reno, Nevada. One hundred and eighty-one patients were asked to complete the BAP and other measures. Three patients refused to take the questionnaire, and four subjects were excluded because they failed to complete all of the measures. The second group of subjects were new referrals from other pain programs across the country. Seventy percent of the 217 patients contacted (n = 152) completed the BAP. All subjects were volunteers.

The sample for Phase Two consisted of 163 men and 163 women. The mean age was 41 years (SD = 12.25). The mean duration of chronic pain was 2.9 years (range = 6 months to 48 years). The location of the primary pain complaint was varied with the largest group of subjects (n = 209) reporting low back pain. Subjects rated the average severity of their pain problem as 4.5 on a 0-7 scale (0 = *no pain at all*, 7 = *excruciating pain*). They rated their worst pain as 5.8 on average.

The majority of subjects were Caucasian (89.6%), 2.8% Black, 2.5% Hispanic, and 0.9% Asian. Sixty-two percent of the sample reported being married, and 45% of those individuals reported they had been married more than once. Fifty-eight percent of the sample had been off work for more than four months and 19% for over two years. Sixty-six percent of the sample reported receiving disability payments. The largest percent of subjects were employed or had been working in skilled jobs (49%). Thirty-four percent of the sample indicated that they were involved in a lawsuit or had retained an attorney.

Procedure. As part of the initial intake, subjects from the Reno outpatient pain program (n = 174) were evaluated by either a clinical psychologist or an advanced graduate student in clinical psychology After it was determined that no serious psychopathology, language problems, or reading difficulties were present, the patients were asked to complete an assessment package consisting of the revised BAP, Sickness Impact Profile (SIP) (15,16), Minnesota Multiphasic Personality Inventory (MMPI) (17), Millon Behavioral Health Inventory (MBHI) (18), Millon Clinical Multiaxial Inventory (MCMI) (19), West-Haven Yale Multidimensional Pain Inventory (WHYMPI) (11), Beck Depression Inventory (BDI) (20), and the Locke-Wallace Marital Inventory (L-W) (21). Subjects were asked to complete measures other than the BAP to test for concurrent validity. The total time to complete all the instruments was approximately 4 hours.

Six outpatient chronic pain programs from across the country also participated in Phase Two (n = 152). Subjects in this subset were asked to complete only the BAP. Participating program clinicians were requested to administer the BAP to new patients and to adhere to the inclusionary criteria discussed earlier.

Phase Two results. *Preliminary item analysis*. The 10% item exclusion procedure used in Phase One was utilized for all items on the BAP. Total subscale scores were computed from the remaining items. Five items were removed from the analysis.

Comparison between Phase One and Phase Two samples. A comparison was made between Phase One and Phase Two samples using the chi-square analysis and t tests (see Table II). The results showed no differences between the groups for marital status, employment status, or primary pain location. However, the samples did differ for gender and age. The Phase Two sample had significantly more males and a mean age 2 years younger than the Phase One sample.

Pearson correlations between age and total scores on all subscales of the BAP showed no significant relationships. However, point-biserial correlations between gender and all

Table II. Demographic characteristics of subjects by sample (n = 633)

Variable	Phase One sample (n = 307)	Phase Two sample (n = 326)	P
Sex [1]			<.01
Male (%)	35	50	
Female (%)	65	50	
Mean age [2]	44.38	41.67	<.01
Race (%)			
Caucasian	*	89.6	
Black	*	2.8	
Hispanic	*	2.5	
Asian	*	0.9	
Other	*	3.0	
Marital status (%) [1]			ns
Single	9.8	5.5	
Married	61.9	62.3	
Divorced/separated	19.9	20.6	
Widowed	2.6	4.9	
Education (%)			
College graduate	*	12	
Partial college training	*	27	
High school graduate	*	29	
GED or technical school	*	14	
Partial high school	*	13	
Partial Jr high school	*	5	
Employment status (%) [1]			
Not working	66.5	66.0	ns
Receiving Disability	*	66.0	
Primary Pain location (no.) [1]			ns
Low back	205	209	
Other (leg, head, neck, etc.)	102	117	

Note: * = data not available
[1] Statistical comparison by chi square
[2] Statistical comparison of age by t test

subscales showed that gender was significantly related to the Domestic/Household Subscale for current activities ($r = .45$, $p < .0001$) and the Domestic/Household Subscale for past activities ($r = 0.71$, $p < .0001$). This finding is not surprising. It suggests that men and women differ across domestic and household activities both before and after the occurrence of their chronic pain problems. When viewed in their entirety, the results show that the subscales were unrelated to gender and age. Therefore, all subsequent analyses were performed on the total sample rather than on any demographic subsets.

Exploratory factor analysis. Exploratory factor analyses were carried out on the Coping Scale since this scale was revised from Phase One and no *a priori* assumptions about item clusters were made. Each of the three coping situations was submitted to principal component factor analysis. Items were considered for selection if they had a statistically significant factor loading of 0.30 or above and discriminated between other factors by at least 0.15. A 3-factor solution accounted for more than 60% of the total common variance for all three coping situations. Eight items were retained. The 3 factors seem to reflect positive cognitive coping (distraction, positive self-statements, and non-catastrophizing statements), positive physical coping (stretching and relaxing), and maladaptive coping (asking others for help, hoping, and taking PRN narcotic medications).

Confirmatory factor analysis. Confirmatory factor analyses were performed on seven of the scales of the BAP to test how well the *a priori* model approximated the Phase Two data. The 7 scales examined included: Physician, Spousal, Current Physical Activity, Avoidance, Beliefs, Negative Mood, and Perceived Consequences scales. The Before Activity Subscale was not analyzed, and the Coping Scale was subjected to exploratory factor analysis (see above). The Lisrel VI software for testing structural equation models was used for all analyses (22).

The factor structure of each scale was examined using the following strategy. First, all items were included in the subscales suggested by the results from Phase One. The maximum likelihood solution was then examined to assess how well the *a priori* subscale structure approximated the observed data. Modification indices were examined if the goodness-of-fit indices were unsatisfactory. Individual items with modification index values above 5.0 were selected and freed for the next Lisrel run (22). This procedure was utilized until adequate goodness-of-fit indices were reached.

On average, two Lisrel runs per scale were required before acceptable goodness-of-fit index levels were reached; 5 of the 7 scales met adequate goodness-of-fit criteria after two Lisrel runs, two of the 7 scales, the Beliefs Scale and the Spousal Scale, failed to show adequate goodness-of-fit values after two Lisrel runs. These scales were subjected to factor analysis procedures and/or item analysis to elucidate the source of variation and covariation (22). These analyses suggested that the Beliefs Scale be reduced from a 9- to an 8-factor solution. The Blaming Doctor Subscale and the Lack of Medical

Comprehensiveness Subscale were combined, and the Catastrophizing/Depression Subscale was separated into Catastrophizing and Depression. The Family Guilt Subscale was eliminated.

The Spousal Scale remained unchanged in factor structure, but 9 items that failed to load using the acceptance criteria discussed earlier were eliminated. The first Lisrel run produced a moderate goodness-of-fit between the *a priori* model and the observed data (X^2 = 294.91 with 113 degrees-of-freedom, GFI = 0.87, RMR = 0.08). Examination of the modification indices indicated that changes in the specification of ten items in the model would improve the fit of the data. When this was done, acceptable goodness-of-fit values resulted (X^2 = 165.88 with 102 degrees-of-freedom, GFI = 0.92, RMR = 0.04; see Table III).

Table III. Goodness of fit indices for confirmatory factor analysis models: Overall sample

Scales	subscales	(n)	x^2	df	x^2/df	GFI	AGFI	RMR
Physician	4	293	333.24	150	2.22	.902	.863	.058
Spousal	4	235	165.88	102	1.62	.924	.887	.042
Current Physical Activity	5	254	770.11	496	1.55	.850	.820	.052
Avoidance	4	259	546.21	298	1.83	.866	.830	.045
Beliefs	8	297	292.70	259	1.13	.931	.906	.039
Negative Mood	4	240	656.08	324	2.02	.836	.794	.047
Perceived Consequences	5	306	540.11	187	2.88	.866	.879	.044

Note: Abbreviations, GFI = goodness-of-fit index provided in LISREL; AGFI = adjusted goodness-of-fit; RMR = root mean-square residual of the model.

An overall summary of the results from confirmatory factor analysis is shown in Table III. In general, the *a priori* model for all 7 scales was supported according to the various goodness-of-fit indexes.

Internal reliability. Internal consistency was evaluated for each subscale using Chronbach's alpha. The majority of reliability coefficients exceeded a value of 0.80. Three of the subscales had a value below 0.50. These were the Personal Care Activities Subscale for past activities (0.44), Personal Hygiene Activities Subscale for past activities (0.43), and Personal Care Activities Subscale for current activities (0.37).

Scale Intercorrelations. Correlations among the subscales were moderate to low.[1] The absolute magnitudes of all correlational coefficients were lower than their respective alpha levels (11). Thus, each scale revealed variances that were unique. Further support of the distinctiveness or uniqueness of separate scales is found in the relative lack of correlation among the various subscales.

Test-retest reliability. Test-retest reliability was completed for each subscale. Thirty-five subjects recruited from the Reno area were asked to complete the BAP as part of their initial examination. Ten days to two weeks later, they were readministered the BAP. Data from the two administrations were used to evaluate the temporal stability of the measure. Test-retest coefficients for the majority of scales exceeded 0.80. Two of the subscales had coefficients below 0.60. These were the Spousal Reinforcement of Wellness Subscale (0.58) and the Personal Hygiene Activities Subscale for past activities (0.45).

Concurrent validity. The BAP subscale scores were correlated with similar scales from well-known and established questionnaires such as the SIP. Depression and Anxiety subscales were correlated with the MMPI Depression Scales, the MCMI Depression Scale, and the BDI. All correlations were positive and statistically significant. The BAP Depression Scale was correlated with the Beck Depression Inventory (r=0.76); Scale 2 of the MMPI (r = 0.54); the MMPI Dysthymia Scale (r = 0.61); the MMPI Harris-Lingoes subscales: D1, Subjective Depression (r = 0.59); D4, Mental Dullness (r = 0.58); D5, Brooding (r = 0.64); and the Millon Clinical Multiaxial Inventory Dysthymia Scale (r = 0.61).

The Anxiety Scale of the BAP was related to several measures of anxiety including Scale 7 of the MMPI (r = 0.44), the Welsch Anxiety Scale of the MMPI (r = 0.46), the MMPI Manifest Anxiety Scale (r = 0.57), and the Millon Clinical Multiaxial Inventory's Anxiety Scale (r = 0.42).

The Spouse/Partner Influence subscales were correlated with the WHYMPI. The correlations were positive and in the expected direction (*i.e.*, for BAP's Spousal Reinforcement of Pain and the WHYMPI's Spousal Solicitousness Scale, r = 0.75; for BAP's Spousal Discouragement of Pain and the WHYMPI's Spousal Punishment, r = 0.76). Correlations between the Spouse/Partner Influence Subscales and the L-W were also examined. Patients reporting greater marital satisfaction showed higher reinforcement of pain scores (r = .42). Patients with lower marital satisfaction scores rated their spouses as more punishing on the BAP.

Correlations between the Current Activity Level subscales and subscales of the SIP and WHYMPI were significant. The BAP's Domestic/Household Subscale was related to the SIP's Home Management Subscale (r = -0.52) and the WHYMPI's Household Chores Subscale (r = 0.72). The Heavy Activity Subscale was correlated with the WHYMPI's Outdoor Work Subscale (r = 0.59), while the Social Activity Subscale of the BAP was correlated with the WHYMPI's Activities Away from Home category (r = 0.63). The Personal Care and Personal Hygiene subscales of the BAP showed low correlations with the SIP and the WHYMPI (*e.g.*, r = -.18) (see Table IV).

The BAP subscales were also correlated with various demographic and descriptive variables such as length of time off work, number of health care visits, number of emergency

[1]Correlation matrix for all scales in Phase Two is available upon request.

Table IV. Pearson correlation coefficients between the BAP current activity scales and other instruments

External Criterion	BAP Current Activity Scales				
Measure	CDH	CH	CS	CPC	CPHG
Sickness Impact Profile (SIP)					
Home Management	-.5190	-.3832	-.3285	-.3120	-.1838
Ambulation	-.3279	-.3782	-.3201	-.3678	-.2041
Mobility	-.3635	-.2456	-.3670	-.2455	-.2592
West Haven Yale Multi-dimensional Pain Inventory (WHYMPI)					
Household Chores	.7222	.3000	.2407	.2992	.3601
Outdoor Work	.2370	.5872	.1271	.4144	.2563
Activities away from home	.2993	.1765	.6287	.3708	.2677
Social Activities	.2329	.1619	.3792	.3381	.2483

Note: CDH = Current Activity level-Domestic/Household activities; CH = Current Activity level-Heavy activities; CS = Current Activity level-Social activities; CPC = Current Activity level-Personal Care activities; CPHG = Current Activity level-Personal Hygiene activities. All coefficients were significant at the .0001 level.

Pearson Correlation Coefficients between the BAP Spouse Influence scales and Other Instruments

External Criterion	BAP Spouse Scales	
Measure	Reinforcement of Pain (SRP)	Discouragement of Pain (SDP)
West Haven Yale Multi-dimensional Pain Inventory (WHYMPI)		
Spouse Punishment	-.3773	.7568
Spouse Solicitousness	.7491	-.3014
Locke-Wallace Marital Adjustment Test	.4179	-.3671

Note: All coefficients were significant at the .0001 level.

room visits, frequency of alcohol, stimulant and narcotic use, decreased enjoyment of social and recreational activities, and so on. All correlations were in the direction expected. For example, the Activity Avoidance Subscales were correlated with decreased enjoyment of social and recreational activities ($r = 0.29$)

Discriminant validity. Discriminant analysis was used to assess the accuracy of the BAP in correctly classifying high and low levels of functional impairment as measured by the Sickness Impact Profile (16). Patients were divided into high and low groups based on their SIP scores. Patients with SIP scores in the upper one-third reflected greater dysfunction ($n = 42$). Patients with SIP scores in the lower one-third were considered less dysfunctional ($n = 30$). The Belief Subscales taken as a whole classified 85% of the highly dysfunctional from the less dysfunctional pain patients. When the Belief Subscales were combined with the Activity Avoidance Subscales, activity interference score, Anxiety, Depression, and the Perceived Consequences Subscales, a 97% correct classification rate was achieved.

DISCUSSION

Recent conceptualizations of pain have emphasized the need to study pain multidimensionally using the biopsychosocial model to define important areas of inquiry. The present study describes the development and psychometric evaluation of a comprehensive instrument designed to measure factors contributing to chronic pain. The internal consistency, stability, factor structure, concurrent and discriminant validity were studied.

The results support the Behavioral Assessment of Pain Questionnaire (BAP) as a reliable and valid self-report instrument. The overwhelming majority of the subscales had respectable factor loadings that were replicated across a separate sample of chronic pain patients.

Measures of internal consistency were generally high and test-retest reliability scores were strong for over 95% of the scales. The exceptions were SRW and CPHG. The relatively low stability scores for these two scales may relate to the heterogeneity of items in each scale or the small number of items comprising each scale.

Correlations with measures of related constructs were all in the expected direction. The BAP also correctly classified over 96% of patients identified as highly dysfunctional by the SIP.

The factor loadings for all subscales were well within acceptable ranges. The BAP appears to be measuring different aspects of chronic pain. Although some of the interscale correlations were moderate to high, the distinctiveness of the scales was supported by within-construct correlations that were higher than cross-construct correlations (23,11).

Scales. (See Table V for a listing of the final scales and subscales) *The Spouse/Partner Influence Scale*. The Spouse/Partner Influence Scale was designed to measure the impact that spouses have on the pain experience. The 4 factor subscale structure of this scale was confirmed. Moderately high correlations were found between the subscales of the WHYMPI measuring spousal solicitousness and punishment of pain behavior and the BAP's Spousal Reinforcement and Punishment of Pain Behavior Subscales, providing some evidence for concurrent validity.

The Spousal Reinforcement of Pain Behavior Subscale was also correlated with marital satisfaction. Other studies have also shown that chronic pain patients report more satisfaction in their marriages when their spouses reinforce and validate their pain experience (24,25). Patients indicating their spouses punished their pain behavior reported more marital distress. The Spousal Punishment of Pain Behavior Subscale was also associated with higher activity interference, depression, anxiety, maladaptive beliefs about pain, and negatively

Table V. Complete listing of all scales and subscales

Physician Influence
- Reinforcement of Pain
- Discouragement of Pain
- Reinforcement of Wellness
- Discouragement of Wellness

Spousal Influence
- Reinforcement of Pain
- Discouragement of Pain
- Reinforcement of Wellness
- Discouragement of Wellness

Activity Level Before
- Domestic/Household
- Heavy Activities
- Social Activities
- Personal Care Activities
- Personal Hygiene Activities

Current Activity Level
- Domestic/Household
- Heavy Activities
- Social Activities
- Personal Care Activities
- Personal Hygiene Activities

Avoidance
- Domestic/Household
- Heavy Activities
- Social Activities
- Personal Care Activities
- Personal Hygiene Activities

Cognitive/Beliefs
- Depression
- Fear of Reinjury
- Expectation for Improvement
- Blaming Self
- Entitlement
- Lack of Medical Comprehensiveness
- Catastrophizing
- Others

Perceived Consequences
- Social Interference
- Productivity
- Physical Harm
- Psychological Harm
- Worsening of Pain

Mood
- Depression
- Muscular Discomfort/Somatic Anxiety
- Anxiety
- Weight Change

Coping
- Maladaptive
- Positive Physical
- Positive Cognitive

perceived consequences of pain (*e.g.*, expectations of physical harm when pain increases). The Spousal Punishment of Wellness Subscale was correlated with higher fears of re-injury.

These findings suggest that spousal punishment of pain and wellness behaviors have deleterious emotional and behavioral effects and may contribute to the quality of the marital relationship in chronic pain patients. Spousal reinforcement of pain behavior was associated with marital satisfaction, but it does not appear to be as strongly related to maladaptive pain behaviors as spousal punishment.

Physician Influence Scale. The Physician Influence Scale was developed to measure the reinforcement and punishment of pain and wellness behaviors by physicians. The subscales are very similar conceptually to the Spousal Influence subscales. The 4 subscales proposed were also confirmed.

Correlation with other BAP subscales showed an association between physician reinforcement of pain behavior and frequency of hospitalizations and maladaptive coping strategies such as asking others for help, hoping and praying the pain will go away, and taking pain medications. Physician punishment of pain behaviors was correlated with several maladaptive beliefs about pain including catastrophizing, blaming doctors, and lack of medical comprehensiveness. Physician promotion of wellness behaviors, such as advocating physical fitness and activity, was correlated with positive physician evaluations, less patient catastrophizing, and less blaming of physicians.

These findings lend support to Fordyce who argued that physician prescribing practices with regard to rest, analgesics, and prescribed activity limit need to be assessed as they may play a role in the maintenance of chronic pain (26). The practices and behaviors of physicians seem to be related to significant adaptive and maladaptive patient behaviors.

Mood. The association between pain and emotional states is well documented (7,27). Two mood subscales, Depression and Anxiety were included in the initial construction of the BAP. Four factors emerged from the results of Phase One factor analyses: depression, anxiety, muscular discomfort/somatic anxiety, and weight change/appetite. These findings were confirmed in Phase Two.

Examination of the relationships between the BAP Depression Subscale and other measures of mood disturbance lend support to its convergent validity. Correlations were noted with other measures of depression such as the BDI, the MMPI's Scale 2 and Dysthymia Scale, and the Millon Clinical Multiaxial Inventories Dysthymia Subscale. It is noteworthy that the BAP Depression Subscale showed little relationship to the Harris-Lingoes Psychomotor Retardation Subscale of the MMPI. This is most likely because the BAP Depression Subscale emphasizes the cognitive aspects of depression. There are few physiologic items such as those measuring fatigue or concerns regarding health. The strong association between the BAP and the more cognitively oriented Brooding Subscale of the MMPI and the BAP Depression Subscale supports this notion.

The Anxiety Subscale of the BAP was confirmed. Convergent validity studies demonstrated an association with other measures of anxiety such as the MMPI Manifest Anxiety Scale, Scale 7, Anxiety Scale and the MCMI Anxiety Scale.

Fairly high correlations were found between the BAP Anxiety and Depression Subscales. However, this is not unusual. In a review of over 30 studies examining the relationship between anxiety and depression, Dobson found an average correlation of 0.61 between self-reported anxiety and depression scales (28).

Both the Anxiety and Depression Subscales were strongly associated with self-reported pain behaviors, avoidance, activity interference, maladaptive coping, maladaptive beliefs, and overall impairment.

The Muscular Discomfort/Somatic Anxiety Subscale was also confirmed in Phase Two. It was strongly correlated with the MBHI Chronic Tension Subscale which measures muscle soreness, tension, and tightness.

It is interesting that many physiologic symptoms that were included in the original Anxiety and Depression subscales loaded on the Muscular Discomfort/Somatic Anxiety Subscale or were dropped because they failed to discriminate between factors. This seems to suggest that physical symptoms are not valid indicators of mood disturbance in chronic pain patients. Physical signs of depression may not belong to the core symptoms of depression manifested by chronic pain patients. Most chronic pain patients complain of sleep disturbance, weight and appetite changes, and some degree of muscular tension. This does not mean all pain patients are depressed.

Coping. There is evidence that coping strategies are important in determining how patients adjust to chronic pain (29). Coping refers to thoughts and behaviors that are used to manage pain or the emotional reactions to pain. Coping with chronic pain was examined in the present study by utilizing a paradigm that measured the frequency of various coping strategies across several hypothetical situations. The results suggested a 3-factor solution: positive cognitive coping, positive physical coping, and maladaptive coping. The term maladaptive refers to behaviors/beliefs that are likely to be associated with higher levels of dysfunction. These factors appear to support previous research which identifies both cognitive and behavioral coping dimensions as important in coping (13). Correlational analyses between the 3 factors showed that maladaptive coping moderately correlated with activity avoidance, depression, anxiety, maladaptive beliefs, such as catastrophizing and entitlement, and overall level of functional impairment. The positive cognitive and physical coping strategies were associated with lower dysfunction scores on the SIP.

Beliefs and perceived consequences. The 9-factor solution for the Beliefs Scale was confirmed with few exceptions. The Depression/Catastrophizing Subscale was split into two scales-Depression and Catastrophizing, and the Guilt Subscale merged with the Depression Subscale. All of the subscales exhibited high internal consistency scores. The subscales showed low to moderate correlations with other BAP scales, such as activity avoidance and emotional distress. Correlations with the SIP revealed a strong relationship between maladaptive beliefs and overall impairment. These data and findings from other studies (30) strongly suggest that maladaptive beliefs play an important role in understanding chronic pain and the impairment caused by chronic pain.

The Perceived Consequences Scale was also supported. The 5 subscales were designed to measure the presence of various negative expectations patients may report whenever their pain increases. It was hypothesized that higher scores would be related to lower activity, mood disturbance, and other aspects of impairment. Correlational analyses between the Perceived Consequences Subscales and all other subscales of the BAP supported the notion that patients' negative expectations of threat are associated with several important aspects of pain behavior including mood disturbance, avoidance of activities, maladaptive beliefs about pain, pain behaviors, and impairment as measured by the SIP. The scale needs to be examined more closely for differences in the way patients endorse some negative expectations and not others. The strong relationship between the Perceived Consequence Scale and negative mood, including the Catastrophizing and Depression subscales, suggests the scale is measuring aspects of suffering. This is especially true when suffering is conceptualized as a negative affective experience brought on by the expectation of unpleasant events (6).

Activity level. The Activity Scale was designed to sample a variety of household, social, and recreational activities. Work-related activities were not assessed. Five activity subscales emerged in Phase One : Domestic/Household, Heavy, Social, Personal Care, and Personal Hygiene activities. These results were confirmed in Phase Two. The internal reliability for each subscale was moderate to high. Personal Care and Personal Hygiene were the least homogeneous. The 5 Activity Subscales are similar to what has been found in other studies (11). The Activity Subscales were related to decreased enjoyment for social and recreational activities, excessive pain behaviors, and overall impairment when changes in activity were studied. The greater the decline in activity level, the more patients were likely to report problems.

Avoidance. The Avoidance of Activities Subscales were correlated with activity interference, but the two groups of subscales appear to be unique. The Avoidance Scale was associated with symptoms of anxiety, negatively perceived consequences, and maladaptive coping. None of these variables were related to activity interference. It does not seem surprising that patients' estimation of activity avoidance would be influenced not only by the degree of physical avoidance from pain producing events, but also by negative expectations (*i.e.*, perceived consequences), coping style, and emotional suffering.

The BAP represents a successful attempt to integrate the multiple factors associated with chronic pain. However, the interpretation of the present findings should be viewed as preliminary and moderated within the limitations of the study.

First, the BAP is a self-report measure and is susceptible to the shortcomings inherent in any self-report instrument. Namely, the accuracy of estimations patients make of their behavior in relation to various social, behavioral, and physiologic events is subject to distortion because of loss of memory and various demand characteristics (*e.g.*, wanting to be perceived in a favorable light). The relatively high test-retest scores mitigates but does not remove this source of error. Second, even though the factor loadings for all of the subscales met acceptable levels, some of the subscales exhibited poor total item correlations (*i.e.*, Personal Care and Personal Hygiene). This may have been due to the heterogeneity of the subscale content or the small number of items in each of these scales. Further studies are needed to help remedy the problems of these subscales. Third, although the factor structure and subscale intercorrelations of the BAP appear to support the uniqueness of the individual subscales, future studies need to examine any higher order factor structure. This might help simplify the infrastructure of the BAP and contribute to a conceptually more interpretable instrument.

Despite its limitations, the BAP appears to be a promising new instrument that fills the need for a single, comprehensive, and multidimensional measure that is reliable and valid (31). The BAP integrates biologic, psychologic, social and environmental factors that appear to play an important role in understanding chronic pain. The BAP has potential usefulness as a screening instrument for determining the degree of behavioral impairment in chronic pain patients with lower back pain and related pain problems, and it should help assist in treatment planning and evaluating outcome.[2] The BAP should be utilized with other instruments such as the MMPI and measures of physical capacity and physical exam in order to fully document, in a systematic fashion, the needs of patients.

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[2]A seventeen page clinical report is computer generated from each BAP administered. A sample of this report is available upon request.

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