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Dimensionality and Reliability Assessment of the Pain Patient Profile Questionnaire

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Abstract. *Objective:* To factor analyze the Pain Patient Profile questionnaire (P3; Tollison & Langley, 1995), a self-report measure of emotional distress in respondents with chronic pain. *Method:* An unweighted least squares factor analysis with oblique rotation was conducted on the P3 scores of 160 pain patients to look for evidence of three distinct factors (i.e., Depression, Anxiety, and Somatization). *Results:* Fit indices suggested that three distinct factors, accounting for 32.1%, 7.0%, and 5.5% of the shared variance, provided an adequate representation of the data. However, inspection of item groupings revealed that this structure did not map onto the Depression, Anxiety, and Somatization division purportedly represented by the P3. Further, when the analysis was re-run, eliminating items that failed to meet salience criteria, a two-factor solution emerged, with Factor 1 representing a mixture of Depression and Anxiety items and Factor 2 denoting Somatization. Each of these factors correlated significantly with a subsample's assessment of pain intensity. *Conclusion:* Results were not congruent with the P3's suggested tripartite model of pain experience and indicate that modifications to the scale may be required.

Keywords: Pain Patient Profile questionnaire, pain perception, psychometric properties, factor analysis

Pain perception is widely recognized as being multifactorial and most modern conceptualizations of pain experience could be described as biopsychosocial. Psychological factors that influence pain experience are numerous and can include mood, anxiety, thought processes, personal coping mechanisms, social support, and personality factors.

Following from the biopsychosocial conceptualization of pain, a wide range of measures of pain perception and pain experience have been developed. One such measure is the Pain Patient Profile questionnaire (P3; Tollison & Langley, 1995). The P3 was designed specifically for use with pain patients and provides separate numerical indices of depression, anxiety, and somatization (physical symptoms, somatic functioning, and magnitude of concern about pain). The P3 also is unique in that it contains a validity scale that was designed to detect random responding, reading comprehension problems, and magnification of symptoms (Tollison & Langley, 1995). The P3 was normed on both pain patients and a community sample and the test authors reported satisfactory item scale correlations, a high level of test-retest reliability, and adequate scale score reliability (Tollison & Langley, 1995). The test authors also observed moderately high intercorrelations between the three clinical scales (Depression-Anxiety .73; Depression-Somatization .60; Anxiety-Somatization .58) and moderately high to high correlations with analogous scales on the MMPI (.65–.82).

Two independent studies have examined the psychometric characteristics of the P3. Willoughby, Hailey, and Wheeler (1999) administered the P3 to 70 pain patients and 40 people with diabetes. Participants also completed an anxiety measure (Trait Anxiety Scale from the State Trait Anxiety Inventory), a depression measure (Beck Depression Inventory), and a somatization measure (Somatization Scale from the Brief Symptom Inventory). Willoughby et al. (1999) found strong positive correlations between the P3 clinical scales and respective measures of depression (r = .90), anxiety (r = .88), and somatization (r = .69). However, they also reported moderately high to high correlations among the P3 scales (Depression-Anxiety .87; Depression-Somatization .71; Anxiety-Somatization .60). McGuire and Shores (2004) reported normative data for the P3 from an Australian chronic pain population. They observed a comparable mean and standard deviation (*SD*) and a similar spread of scores on the P3 clinical scales in comparison to the USA normative pain sample, and concluded that the P3 appeared to be suitable for use with an Australian chronic pain population. Finally, a series of studies examined the utility of the P3 in medicolegal assessment, focusing specifically on the assessment of pain simulation (McGuire, Harvey, & Shores, 2001; McGuire & Shores, 2001). These authors concluded that the P3 clinical and validity scales could differentiate chronic pain patients from pain simulators and may have some utility in medicolegal assessment.

A particularly useful feature of the P3 is that it provides information on the specific factors of depression, anxiety, and somatization, all of which may have separate and spe-

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cific implications for treatment of people with chronic pain. Given the purported tripartite division of the P3, the dimensionality of this measure warrants investigation. However, to date, there are no published assessments of the scale's factor structure. The purpose of the current study, therefore, was to address this omission by conducting an exploratory factor analysis of items on the P3.

Method

Participants

The sample consisted of 160 consecutive patients (76 males; 84 females) with chronic benign pain, referred to the first author for psychological pain management. Mean ages for men and women were 37.3 years (*SD* = 10.0, range = 16–59) and 38.9 years (*SD* = 10.7, range = 20–65), respectively. The patients had experienced pain on average 42.3 months (*SD* = 57.7, range = 3–456 months). The average pain intensity at the time of assessment was 6 on a 0–10 scale where 0 = *no pain* and 10 = *worst possible pain* (*SD* = 2.2, range = 1–10). The site of the chronic pain varied from individual limbs and regions (e.g., leg, arm, lower back) to multiple sites of pain. The most frequent pain problem reported was low back pain (89), followed by neck pain (16), leg(s) (13), head (10), arm(s) (10), hand(s) (7), abdomen (6), chest (5), and hip(s) (4).

Instrument

The P3 is a 44-item, self-report, multiple-choice instrument designed to identify patients who are experiencing emotional distress associated with primary complaints of pain (Tollison & Langley, 1995). The P3 is appropriate for patients suffering pain as a result of disease, illness, or physical trauma (Tollison & Langley, 1995). As mentioned earlier, the P3 has three clinical scales: depression (14 items), anxiety (12 items), and somatization (13 items) and a validity scale (5 items). Each item is scored on a three-point multiple choice scale (1–3). The item scoring typically reflects increasing difficulties as the score increases. However, there is not a uniform response format for each question, rather, each item contains symptom-specific content. For example, Question 1 (depression scale) offers a choice of (1) I usually sleep well. (2) I have some trouble with sleep. (3) I have a lot of trouble with sleep. Question 5 (somatization scale) offers a choice of: (1) I have no more pain problems than most others. (2) I seem to have more pain problems than others. (3) My life is spent in pain.

According to the test manual (p. 21), the depression scale items assess sleep, psychomotor activity, energy, concentration, and decision making, and feelings of helplessness, hopelessness, and low self-worth. The anxiety scale is described (p. 23) as assessing inner turmoil, anger, worry, nervousness, restlessness, and emotional instability. The somatization scale is described (p. 25) as assessing concerns with physical health, bodily processes, muscle tension and spasms, somatic functioning, physical abnormalities, and the magnitude of the person's concern about pain.

Procedure

The P3 was administered to each patient on an individual basis as part of a psychological assessment carried out by the first author.

Results

Participants' mean (*SD*) total scores on the P3 clinical scales were essentially average for a pain population when compared with the normative data for the P3, which reported a mean T-score of 50 for each clinical scale, depression: men = 51.4 (8.7), women = 50.9 (7.8); anxiety: men = 50.7 (9.1), women = 50.6 (8.4); somatization: men = 49.4 (9.0), women = 50.1 (7.5). The mean (*SD*) validity scores for men and women were 8.6 (1.5) and 8.4 (1.5), respectively. Independent samples *t*-tests revealed no significant differences between men and women on any subscale of the P3 (all *t* values < 1.0).

α coefficients and their 95% confidence intervals were calculated for men's and women's scores on the three subscales of the P3. For men, these values were: depression (.87, CI = .82–.91), anxiety (.86, CI = .80–.90), and somatization (.75, CI = .66–.83). For women, similar scale score reliabilities were noted for depression (.84, CI = .79–.89) and anxiety (.83, CI = .77–.88), but not somatization (.68, CI = .57–.78). Inspection of the confidence intervals suggests that for both male and female participants, satisfactory **[Cronbach's?]** α coefficients (i.e., above .75) were found for the depression and anxiety subscales. For the somatization subscale, however, modest levels of scale score reliability were noted (i.e., lower-bound estimates for **[Cronbach's?]** α are < .70).

In determining whether the sample size was sufficient for exploratory factor analysis (EFA), we examined the *N:p* (subject to variable) ratio and the ratio of variables to factors. The *N:p* for this analysis was 4.1, which satisfies guidelines established by Cattell (1978) but does not meet those outlined by other researchers (e.g., Gorsuch, 1983, stipulates a value of 5). However, MacCallum, Widaman, Zhang, and Hong (1999) suggest that when determining whether a given sample size is appropriate for EFA, the degree of factor overdetermination (i.e., the extent to which a factor is represented clearly by a number of variables) is of paramount importance. Specifically, under conditions of wide communality variability (.2 to .8), MacCallum et al. found good recovery of population factors for samples of 60 + provided the ratio of variables to factors was at least

Table 1. Rotated factor loading matrix of 39 P3 items

	Factor 1	Factor 2	Factor 3
Q1: Depression	0.279	0.300	–0.149
Q2: Anxiety	**0.796**	–0.125	–0.068
Q3: Somatization	–0.141	**0.682**	0.100
Q4: Somatization	0.067	**0.503**	0.177
Q5: Depression	0.220	0.402	0.323
Q6: Depression	0.416	0.367	–0.052
Q7: Anxiety	**0.413**	–0.019	0.292
Q8: Somatization	0.251	0.364	0.223
Q9: Depression	**0.803**	0.161	–0.153
Q10: Depression	**0.507**	0.001	0.232
Q11: Somatization	0.331	0.411	0.343
Q12: Depression	**0.521**	0.206	–0.089
Q13: Anxiety	**0.540**	0.041	–0.064
Q14: Somatization	0.246	0.274	0.225
Q15: Anxiety	**0.462**	0.190	–0.012
Q16: Anxiety	**0.649**	–0.040	0.081
Q17: Somatization	0.222	0.335	0.341
Q18: Depression	**0.579**	–0.022	0.344
Q19: Anxiety	**0.733**	–0.177	0.125
Q20: Somatization	0.002	0.002	**0.795**
Q21: Depression	0.373	0.352	0.135
Q22: Anxiety	**0.675**	–0.156	0.030
Q23: Somatization	0.331	–0.098	0.156
Q24: Anxiety	**0.529**	0.275	–0.039
Q25: Somatization	0.107	0.086	**0.603**
Q26: Somatization	–0.214	0.286	**0.521**
Q27: Depression	0.554	0.353	–0.097
Q28: Anxiety	**0.708**	–0.254	0.110
Q29: Somatization	–0.027	0.303	0.112
Q30: Anxiety	**0.775**	–0.095	0.088
Q31: Anxiety	**0.657**	0.076	0.030
Q32: Anxiety	**0.477**	0.111	0.093
Q33: Depression	**0.539**	0.116	0.066
Q34: Somatization	**0.490**	–0.086	0.237
Q35: Depression	**0.705**	0.087	–0.022
Q36: Somatization	0.100	0.250	0.055
Q37: Depression	**0.581**	0.306	–0.244
Q38: Depression	**0.531**	0.215	–0.195
Q39: Depression	0.366	0.137	0.078

Note: Proportions of variance were: 32.1% (Factor 1), 7.0% (Factor 2), and 5.5% (Factor 3). Validity scale items were removed from the analysis. **Bolded** coefficients are those that satisfy criteria for salience (i.e., load at .40 or higher on one factor, but less than .30 on any other factor). Thirteen items did not satisfy these criteria (7 somatization and 6 depression items).

10:3. Given that three factors were anticipated, each of which should be represented by a minimum of 12 items, EFA was deemed to be a suitable analytic technique.

The FACTOR program (Lorenzo-Seva & Ferando, 2003) was used to generate a matrix of polychoric interitem correlations, which was then subjected to EFA. The decision to compute polychoric correlations was based on recognition that the P3 employs a polytomous response format and provides ordinal- rather than interval-level measurement (see Flora, Finkle, & Foshee, 2003, for a description of some of the difficulties that ensue when item-level factor analyses are conducted using Pearson product-moment correlation coefficients). Unweighted least squares (ULS) served as the extraction technique because it is robust for use with data that are not normally distributed. Finally, the rotation was set to direct oblimin because total scores on the depression, anxiety, and somatization subscales were intercorrelated (i.e., *r* values ranged from .55 to .67).

Given concerns about the use of scree plots or Kaiser's criterion to determine the number of factors to retain (e.g., O'Connor, 2000; Reise, Waller, & Comrey, 2000), parallel analysis was employed. Stated briefly, this technique generates eigenvalues from random data sets that match (or are parallel to) the actual data set in terms of number of participants and number of variables. With the FACTOR program, the 95th percentile of random eigenvalues for each factor is compared to the eigenvalue obtained for the actual data set. Factor retention is terminated when the former becomes larger than the latter.

The 95th percentiles for the random eigenvalues generated for the first three factors were smaller than their real data counterparts (2.13 vs. 12.53, 1.98 vs. 2.72, and 1.88 vs. 2.13). However, the 95th percentile for the random eigenvalues corresponding to the fourth factor was larger than the one obtained for the real data set (1.86 vs. 1.80, respectively) suggesting that three factors provided a suitable representation of the data.

As expected, the three factors were modestly intercorrelated (*r* values were F1/F2 = .35, F2/F3 = .13, and F1/F3 = .25). Factor loadings for items on the P3 are provided in Table 1.

Inspection of the rotated loading matrix for the three-factor solution revealed that 13 items either double-loaded (e.g., Q. 6 and Q. 27) or did not achieve the required loading value of .40 (e.g., Q. 8 and Q. 29). Of the remaining 26 items, 21 loaded on Factor 1, two loaded on Factor 2, and three loaded on Factor 3. The content of these loadings suggest that Factor 1 represents an amalgamation of items tapping primarily into anxiety and depression, whereas Factors 2 and 3 represent somatization only. Bentler's simplicity index (S) was .88, suggesting adequate, though not optimal, interpretability and simple structure (Lorenzo-Seva, 2003).

EFA with ULS and oblimin rotation was then repeated on the 26 items of the P3 that loaded at .40 or higher on one factor, but no higher than .30 on any other factor. Parallel analysis revealed that two factors should be retained

Table 2. Rotated factor loadings of 26 P3 items

	Factor 1	Factor 2
Q2: Anxiety	0.**734**	–0.068
Q3: Somatization	0.119	0.137
Q4: Somatization	0.266	0.237
Q7: Anxiety	0.**432**	0.144
Q9: Depression	0.**858**	–0.092
Q10: Depression	0.**520**	0.120
Q12: Depression	0.**612**	–0.137
Q13: Anxiety	0.**564**	–0.092
Q15: Anxiety	0.**557**	–0.003
Q16: Anxiety	0.**649**	–0.009
Q18: Depression	0.652	0.338
Q19: Anxiety	0.**663**	0.094
Q20: Somatization	0.018	0.**736**
Q22: Anxiety	0.**617**	–0.039
Q24: Anxiety	0.**626**	–0.027
Q25: Somatization	0.122	0.**710**
Q26: Somatization	–0.144	0.**700**
Q28: Anxiety	0.**650**	–0.023
Q30: Anxiety	0.**745**	0.068
Q31: Anxiety	0.**665**	0.119
Q32: Anxiety	0.**526**	0.093
Q33: Depression	0.**572**	0.097
Q34: Somatization	0.**481**	0.201
Q35: Depression	0.**731**	–0.005
Q37: Depression	0.**666**	–0.091
Q38: Depression	0.**577**	–0.112

Note: Proportions of variance were: 35.9% (Factor 1) and 8.4% (Factor 2). **Bolded** coefficients are those that satisfy criteria for salience (i.e., load at .40 or higher on one factor, but less than .30 on any other factor). Three items (2 Somatization and 1 Depression) did not satisfy these criteria. Thus, the final version contains 23 items: items 2, 7, 9, 10, 12, 13, 15, 16, 19, 22, 24, 28, 30, 31, 32, 33, 34, 35, 37, 38 (Factor 1, 20 items) and items 20, 25, and 26 (Factor 2, 3 items).

(i.e., the first two eigenvalues from the real data were 9.34 and 2.19, which exceeded the 95th percentile of the randomly generated eigenvalues, 2.00 and 1.80, respectively). The intercorrelation between Factors 1 and 2 was .27. Bentler's simplicity index (S) was .99 suggesting that a two-factor model provided a superior representation of the data in terms of adherence to simple structure and ease of interpretation. Inspection of the rotated loadings (see Table 2) revealed that 20 items loaded on Factor 1 (12 anxiety, 7 depression, and 1 somatization), and three items loaded on Factor 2 (3 somatization).

Scale score reliabilities were .89 (95% CI = .87–.92) and .64 (95% CI = .57–.73) for the items loading on Factors 1 and 2, respectively. Validity coefficients were then calculated between the pain intensity ratings provided by 105 of the 160 participants and their summed scores for the items denoting Factors 1 and 2. Overall correlations between pain intensity and Factor 1 and Factor 2 scores were statistically significant: .21, $p < .05$ and .43, $p < .01$, respectively. Thus, participants who evidenced higher levels of depression, anxiety, and somatization – as measured by the P3 factors – also reported experiencing greater pain intensity. For men, the correlations were .24 (pain intensity and Factor 1 scores) and .53 (pain intensity and Factor 2 scores), with the latter being statistically significant ($p < .01$). For women, the correlations were .16 and .29 (p = ns). Finally, independent samples t-tests were conducted to identify possible gender differences on the P3 factors. The men (M = 39.25, SD = 8.52) and women (M = 38.82, SD = 7.31) in this study did not differ significantly in their scores on Factor 1, t (148) = .33, p = ns. However, a statistically significant difference was noted in Factor 2 (somatization), with females obtaining significantly higher scores (M = 7.79, SD = 1.12) than males (M = 7.04, SD = 1.53), t (129.31) = –3.41, $p < .001$, Cohen's d = .60 (medium effect).

Discussion

Results of the current study do not provide compelling support for the tripartite structure of the P3. Parallel analysis suggested that three factors should be retained; however, the resultant constellations of items did not reflect the anticipated distinctions among depression, anxiety, and somatization.

The application of modestly stringent factor-loading criteria resulted in the elimination of 13 items, a majority of which were designed to measure somatization. When the ULS estimation was repeated with the reduced set of items, a two-factor solution was obtained. Bentler's simplicity index suggested that this model adhered closely to simple structure and was readily interpretable. Congruent with the previous analysis, the depression and anxiety items loaded together on the first factor, with the second factor being represented by somatization items. From a clinical perspective, the clustering of depression and anxiety items is not surprising, since the two are often comorbid (Sadock & Sadock, 2003). For example, the DSM-IV states that rates for comorbid depression and panic disorder are at least 10% and rates of up to 65% have been reported (American Psychiatric Association, 2000). Recent neuropsychological studies have confirmed that depression and anxiety are related, but separate, clinical entities (Keller et al., 2000; Thibodeau, Jorgensen & Kim, 2006). The separation of somatization into an independent factor is encouraging because efforts to measure depression in chronic pain can be confounded by an overlap between the somatic symptoms of depression and the physical symptoms attributable to pain.

[Cronbach's?] α coefficients for the two-factor model of the P3 were excellent for the 20 items representing Factor 1 and satisfactory for the three items characterizing Factor 2. Statistically significant correlations between total scores for the items denoting each factor and a self-report

measure of pain intensity indicate that this modified version of the P3 may possess criterion-related validity. However, additional validation work is required, especially in relation to confirming the gender differences observed.

The use of EFA could not produce a reasonably tidy division between items measuring anxiety, depression, and somatization, which are interrelated, though conceptually distinct, constructs. Therefore, at this time, it is not recommended that researchers using the P3 compute separate scores for the three subscales or separate scores for the two factors reported in the current study. In this context, the P3 might best be considered a measure of psychological distress in people with chronic pain. The inclusion of a validity scale suggests an ongoing utility for the test in medicolegal assessment.

Psychometric testing is an incremental process (Carmines & Zeller, 1979); thus, additional research with larger samples of pain patients is needed to replicate the factor output noted in this study. If the two-factor model that we obtained is replicated, its suitability should be tested via confirmatory factor analysis, which provides myriad tests of model fit. It is critical, however, that *all* factorial assessments of the P3 use polychoric correlation matrices so as to avoid identification of spurious factors and biased model fit statistics (Flora et al., 2003). If subsequent work reveals that items assessing anxiety and depression are conflated, then the degree to which researchers are interested in the unique contribution of depression, anxiety, and somatization vis-à-vis the treatment of people with chronic pain will dictate whether retooling of the P3 is required.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed. – Text Revision). Washington, DC: American Psychiatric Association.

Carmines, E.G., & Zeller, R.A. (1979). *Reliability and validity assessment.* Thousand Oaks, CA: Sage.

Cattell, R.B. (1978). *The scientific use of factor analysis.* New York: Plenum.

Flora, D.B., Finkel, E.J., & Foshee, V.A. (2003). Higher-order factor structure of a self-control test: Evidence from confirmatory factor analysis of polychoric correlations. *Educational and Psychological Measurement, 63,* 112–127.

Gorsuch, R.L. (1983). *Factor analysis* (2nd ed.). Hillsdale, NJ: Erlbaum.

Keller, J., Nitschke, J.B., Bhargava, T., Deldin, P.J., Gergen, J.A., Miller, G.A. et al. (2000). Neuropsychological differentiation of depression and anxiety. *Journal of Abnormal Psychology, 109*, 3–10.

Lorenzo-Seva, U. (2003). A factor simplicity index. *Psychometrika, 68,* 49–60.

Lorenzo-Seva, U., & Ferrando, P.J. (2006). FACTOR: A computer program to fit the exploratory factor analysis model. *Behavioural***[below Behaviour]** *Research Methods, Instruments, and Computers, 38,* 88–91.

MacCallum, R.C., Widaman, K.F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological Methods, 4,* 84–99.

McGuire, B.E., Harvey, A., & Shores, E.A. (2001). Simulated malingering in pain patients: A study with the Pain Patient Profile. *British Journal of Clinical Psychology, 40,* 71–79.

McGuire, B.E., & Shores, E.A. (2001). Pain Patient Profile and the assessment of malingered pain. *Journal of Clinical Psychology, 57,* 401–409.

McGuire, B.E., & Shores, E.A. (2004). The Pain Patient Profile: Data from an Australian chronic pain sample. *Australian Psychologist, 39,* 97–100.

O'Connor, B.P. (2000). SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. *Behaviour***[above Behavioural]** *Research Methods, Instruments, and Computers, 32,* 396–402.

Reise, S.P., Waller, N.G., & Comrey, A.L. (2000). Factor analysis and scale revision. *Psychological Assessment, 12,* 287–297.

Sadock, B.J., & Sadock, V.A. (2003). *Synopsis of psychiatry* (9th ed.). Philadelphia, PA: Lippincott, Williams, & Wilkins.

Thibodeau, R., Jorgensen, R.S., & Kim, S. (2006). Depression, anxiety, and resting frontal EEG asymmetry: A meta-analytic review. *Journal of Abnormal Psychology, 115*, 715–729.

Tollison, D.C., & Langley, J.C. (1995). *Pain Patient Profile manual.* Minneapolis, MN: National Computer Services.

[not cited in text]Tollison, D.C., & Satterthwaite, J.R. (1991). Chronic benign pain: Diagnosis and behavioral management. *Journal of Musculoskeletal Medicine, 8*(9), 55–66.

Willoughby, S.G., Hailey, B.J., & Wheeler, L.C. (1999). Pain Patient Profile: A scale to measure psychological distress. *Archives of Physical Medicine and Rehabilitation, 80,* 1300–1302.

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