<table>
<thead>
<tr>
<th><strong>Title</strong></th>
<th>Dimensionality and reliability assessment of the Pain Patient Profile questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Author(s)</strong></td>
<td>McGuire, Brian E.; Hogan, Michael J.; Morrison, Todd G.</td>
</tr>
<tr>
<td><strong>Publication Date</strong></td>
<td>2008-02</td>
</tr>
<tr>
<td><strong>Link to publisher's version</strong></td>
<td><a href="http://dx.doi.org/10.1027/1015-5759.24.1.22">http://dx.doi.org/10.1027/1015-5759.24.1.22</a></td>
</tr>
<tr>
<td><strong>Item record</strong></td>
<td><a href="http://hdl.handle.net/10379/3812">http://hdl.handle.net/10379/3812</a></td>
</tr>
<tr>
<td><strong>DOI</strong></td>
<td><a href="http://dx.doi.org/DOI">http://dx.doi.org/DOI</a> 10.1027/1015-5759.24.1.22</td>
</tr>
</tbody>
</table>
Passed for Press

I confirm that the enclosed article for the European Journal of Psychological Assessment entitled

is ready for press after the corrections indicated have been carried out.

Date                                               Signature                                               Name (block letters)

Please check the enclosed proofs for typesetting errors, and indicate any unavoidable corrections that must be carried out before the article is sent to press. Proof corrections that represent a change from or an addition to the original manuscript should be avoided. Depending on the extent of such changes or additions, the author may be invoiced for the extra costs that result. Please send the signed “Passed for Press” statement along with the corrected proofs to the address given below.

Copyright: Guidelines for Authors

By submitting an article, the author confirms and guarantees on behalf of him-/herself and any coauthors that he or she holds all copyright in and to the submitted contribution, including any figures, photographs, line drawings, plans, maps, sketches, and tables, and that the article and its contents do not infringe in any way on the rights of third parties.

The author agrees, upon acceptance of the article for publication, to transfer to the publisher the exclusive right to reproduce and distribute the article and its contents, both physically and in non-physical, electronic, or other form, in the journal to which it has been submitted and in other independent publications, with no limitations on the number of copies or on the form or the extent of distribution. These rights are transferred for the duration of copyright as defined by international law. Furthermore, the author transfers to the publisher the following exclusive rights to the article and its contents:

1. The rights to produce advance copies, reprints or offprints of the article, in full or in part, to undertake or allow translations into other languages, to distribute other forms or modified versions of the article, and to produce and distribute summaries or abstracts.

2. The rights to microfilm and microfiche editions or similar, to the use of the article and its contents in videotext, teletext, and similar systems, to recordings or reproduction using other media, digital or analogue, including electronic, magnetic, and optical media, and in multimedia form, as well as for public broadcasting in radio, television, or other forms of broadcast.

3. The rights to store the article and its contents in machine-readable or electronic form on all media (such as computer disks, compact disks, magnetic tape), to store the article and its contents in online databases belonging to the publisher or to third parties for viewing or downloading by third parties, and to present or reproduce the article or its contents on visual display screens, monitors, and similar devices, either directly or via data transmission.

4. The rights to reproduce and distribute the article and its contents by all other means, including photomechanical and similar processes (such as photocopying or facsimile), and as part of so-called document delivery services.

5. The right to transfer any or all of the rights mentioned in this agreement, as well as the rights retained by the relevant copyright clearing centers, including the corresponding royalty rights to third parties.

6. Online Rights for Journal Articles

Authors of articles in journals published by the Hogrefe Group may post a copy of the final accepted manuscript for non-commercial purposes, as a word-processor, PDF, or other type of file, on their personal web page or on their employer’s website after it has been accepted for publication. The following conditions apply:

- Only the final draft manuscript post-refereeing shall be used for this purpose, not the published version, and this final draft manuscript may only be posted 12 months after the article has been published.
- The posted version of the article must carry the publisher’s copyright notice in the form “[Journal Title], [Volume No.], [Issue No.], © [Year] by [Publisher’s name]”, (as it appears in the published journal/article) and a link to the publisher’s journal home page must be included.
- Further, the posted article must include the following statement: “This article does not exactly replicate the final version published in the journal “[Add title of Journal]”. It is not a copy of the original published article and is not suitable for citation. * The publisher does not permit archiving in any repositories other than the publisher’s own. The publisher cannot provide electronic copies of the published version of the article for posting. Creation of an electronic or digital copy of the published version of the article for the purposes of posting or distributing it is not permitted. (June 7, 2006)
Order Form for Reprints

You will receive 25 reprints of your paper free of charge. Additional copies will be charged as indicated below.

Title of paper: ...........................................................................................................................

Quantity of reprints: 25 complimentary copies plus ....................................................................
additional copies

Address: .....................................................................................................................................
.................................................................................................................................................
.................................................................................................................................................

Order date: ............................................. Signature: .............................................................

Prices for additional reprints*:

<table>
<thead>
<tr>
<th>pages/copies</th>
<th>25</th>
<th>50</th>
<th>100</th>
<th>+100</th>
</tr>
</thead>
<tbody>
<tr>
<td>2–8</td>
<td>€ 35.00</td>
<td>€ 65.00</td>
<td>€ 115.00</td>
<td>€ 100.00</td>
</tr>
<tr>
<td>10–16</td>
<td>€ 65.00</td>
<td>€ 115.00</td>
<td>€ 215.00</td>
<td>€ 200.00</td>
</tr>
<tr>
<td>18–24</td>
<td>€ 90.00</td>
<td>€ 165.00</td>
<td>€ 315.00</td>
<td>€ 300.00</td>
</tr>
</tbody>
</table>

*Shipping & handling included; with orders from countries within the European Union, 7% VAT must be added for reprints unless a VAT number is given when the order is placed.

Order Form

Charge my: □ VISA □ MasterCard □ AmEx

Card # ____________________________ CVV2/DVC2/CID # ____________________________

Expiry Date: ____________________________ Signature: ____________________________

☐ Please bill me      ☐ Cash enclosed      ☐ Check enclosed

☐ I am interested in becoming a member of the European Association of Psychological Assessment.

Name _______________________________________ Title/Affiliation ________________________________

Street _______________________________________ City __________________ State ________________

Zip ___________________ Country ______________ Telephone (               )

I would like to subscribe/order

<table>
<thead>
<tr>
<th></th>
<th>€</th>
<th>Qty</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>EJPA : Individual</td>
<td>109.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EJPA : Institution</td>
<td>197.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reprints (see above)</td>
<td>Subtotal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Shipping + handling € 12.00 for each subscription

Subtotal

Total
Dimensionality and Reliability Assessment of the Pain Patient Profile Questionnaire

Brian E. McGuire, Michael J. Hogan, and Todd G. Morrison
Department of Psychology, National University of Ireland, Galway, Ireland

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-
specific 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.

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

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

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...
(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: $r = .21, p < .05$ and $r = .43, p < .01$, 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 $r = .24$ (pain intensity and Factor 1 scores) and $r = .53$ (pain intensity and Factor 2 scores), with the latter being statistically significant ($p < .01$). For women, the correlations were $r = .16$ and $r = .29$ ($p = n.s.$). 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, $t (148) = .33, p = n.s.$ 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?] $\alpha$ 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 ver-
version of the P3 may possess criterion-related validity. How-
ever, additional validation work is required, especially in
relation to confirming the gender differences observed.

The use of EFA could not produce a reasonably tidy di-
vision between items measuring anxiety, depression, and
somatization, which are interrelated, though conceptually
distinct, constructs. Therefore, at this time, it is not recom-
manded 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 dis-
tress 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 (Car-
mines & 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 assess-
ments 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 somatiza-
tion 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 statis-
York: Plenum.
factor structure of a self-control test: Evidence from confirma-
tory factor analysis of polychoric correlations. Educational
and Psychological Measurement, 63, 112–127.
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. Psychomet-
Lorenzo-Seva, U., & Ferrando, P.J. (2006). FACTOR: A comput-
er program to fit the exploratory factor analysis model. Behavior-
ral below Behaviour) Research Methods, Instruments,
and Computers, 38, 88–91.
Sample size in factor analysis. Psychological Methods, 4,
84–99.
malingering in pain patients: A study with the Pain Patient
McGuire, B.E., & Shores, E.A. (2001). Pain Patient Profile and
the assessment of malingered pain. Journal of Clinical Psy-
ology, 57, 401–409.
McGuire, B.E., & Shores, E.A. (2004). The Pain Patient Profile:
Data from an Australian chronic pain sample. Australian Psy-
chologist, 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.
and scale revision. Psychological Assessment, 12, 287–297.
Sadock, B.J., & Sadock, V.A. (2003). Synopsis of psychiatry (9th
Thibodeau, R., Jorgensen, R.S., & Kim, S. (2006). Depression,
anxiety, and resting frontal EEG asymmetry: A meta-analytic
Chronic benign pain: Diagnosis and behavioral management.
Journal of Musculoskeletal Medicine, 8(9), 55–66.
Profile: A scale to measure psychological distress. Archives of
Physical Medicine and Rehabilitation, 80, 1300–1302.

Brian McGuire

Department of Psychology
National University of Ireland
Galway
Ireland
Tel. +353 91 492954
Fax +353 91 495545
E-mail brian.mcguire@nuigalway.ie