

# Pain Disability Index: Construct and Discriminant Validity

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**ABSTRACT.** Jerome A, Gross RT. Pain disability index: construct and discriminant validity. *Arch Phys Med Rehabil* 1991;72:920-2.

● The Pain Disability Index (PDI) was developed as a self-report measure of general and domain-specific, pain-related disability. This study's purpose was twofold: (1) to assess construct validity of the scale relative to other measures of pain-related disability and psychologic distress and (2) to assess the strength of the PDI, independent of pain intensity, in accounting for behavioral and psychologic aspects of disability. Results indicated stronger correlations for PDI factor 1 (discretionary activities) than factor 2 (obligatory activities), with factor scores significantly related to both psychologic distress and behavioral measures of disability. Partial correlation controlling for pain intensity demonstrated PDI factor 1 was significantly related to depression, employment status, and medication usage. The finding supports the usefulness of the PDI in providing important information on functional disability beyond what is provided by a simple measure of pain intensity.

**KEY WORDS:** Disability evaluation; Pain

Chronic pain is a complex phenomenon that has received much attention because of its significant economic, social, and emotional impact.<sup>1</sup> Although the literature is replete with reports on the development and validation of strategies to assess various aspects of the pain experience,<sup>2,3</sup> comparatively little attention has been given to developing methods to assess the disability associated with chronic pain. A recent report on pain and disability completed under the auspices of the National Academy of Sciences<sup>4</sup> noted the lack of consensus on the most effective means of assessing pain and disability and the need to improve existing methods. The report suggested that because of the imperfect relationship between pain severity and functional impairment, the latter measure may be more relevant in determining level of disability.

Efforts to evaluate pain-related disability have typically included either behavioral measures or patients' self-reports. Behavioral approaches have examined specific features of disability, such as frequency of pain behaviors (grimaces, moaning, or reclining), or conversely, well behaviors, such as uptime or duration walked.<sup>5</sup> These measures provide information about specific aspects of disability; however, they have been criticized for their failure to adequately reflect the complexity and variety of activities of pain patients.<sup>6</sup>

A number of self-report measures have been developed that more adequately reflect the complexity and multidimensionality of pain-related disability. Both the Sickness Impact Profile (SIP)<sup>7</sup> and the West Haven-Yale Multidimensional Pain Inventory (WHYMPI)<sup>8</sup> comprehensively assess the psychosocial dimension of pain-related disability. The 136-item SIP covers 12 categories of daily activities and has been described as an excellent measure of a patient's change over time and response to treatment.<sup>12</sup>

The 52-item WHYMPI assesses the subjective experience of pain across a number of dimensions (e.g., interference with family and marital and social activities). The WHYMPI was specifically developed to assess pain patients, and recent evidence suggests that it provides information on the pain experience not available from other tests.<sup>9</sup> Although these measures have the advantages of being comprehensive, their length may limit their clinical utility. This may be particularly true if pain-related disability is to be measured repeatedly over the course of treatment.

A brief self-report instrument was described by Pollard<sup>10</sup> to measure patient-perceived disability secondary to pain. In that report, Pollard defined disability due to pain as "the extent to which chronic pain interferes with a person's ability to engage in various life activities." He proposed the Pain Disability Index (PDI) as an assessment instrument to operationalize this definition. The PDI is a seven-item, self-report inventory designed to measure both general and domain-specific disability related to chronic pain.

In the original validation study, PDI total score differentiated recent back-surgery patients (high disability) from persons with low back pain who were employed full-time (low disability).<sup>10</sup> In a subsequent study by Tait and associates,<sup>6</sup> the PDI scores were significantly greater for hospitalized chronic-pain patients than for persons with chronic pain treated on an outpatient basis. These data provide evidence for the discriminant validity of the PDI and suggest that it may have utility as a disability screening instrument for chronic-pain patients.

The previous lack of construct validation data on the PDI was addressed recently by Tait and colleagues.<sup>11</sup> In the first of two studies, they demonstrated that patients with high PDI scores were more psychologically distressed, endorsed more descriptions of severe pain, and described more restriction in activities than patients scoring low on the PDI. In fact, they found that subjects grouped on the basis of PDI scores (high vs low) were significantly differentiated on all measures of psychologic distress. In the second study, high-scoring PDI patients and low-scoring PDI patients were also differentiated by rates of pain behavior, with high-scoring PDI patients ex-

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Submitted for publication June 6, 1990. Accepted October 5, 1990.

No commercial party having a direct or indirect interest in the subject matter of this article has conferred or will confer a benefit upon the authors or upon any organization with which the authors are associated.

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hibiting a greater degree of disability and endorsing significantly more disability-associated verbal complaints.

Although the recent work by Tait and colleagues<sup>11</sup> provided important validation information on the PDI, the constructs of disability and pain were not clearly differentiated in their study. The PDI scores and pain intensity were strongly correlated, questioning whether PDI scores provide information on pain-related disability beyond that provided by a simple measure of pain intensity. High PDI scores may simply reflect generalized distress associated with severe pain.

The purpose of the present study was twofold. First, the construct validity of the PDI was further evaluated relative to other measures of pain-related disability and distress. Second, this study assessed the strength of the PDI, independent of pain intensity, in accounting for behavioral and psychologic aspects of disability.

## METHODS

### Subjects

Subjects were 74 patients evaluated at a university-based, multidisciplinary pain clinic. The patient sample was 69% male, with a mean age of 46 years ( $SD=13.9$ ). They had experienced their presenting pain problem for a mean of 4.1 years ( $SD=7.2$ ).

### Materials and Procedures

As part of a comprehensive assessment, patients completed the PDI, the Beck Depression Inventory (BDI),<sup>12</sup> the trait portion of the Spielberger<sup>13</sup> State-Trait Anxiety Inventory (STAI), a comprehensive interview form, and one week of diary recording which included hourly ratings of pain level and medication usage.

The PDI is a seven-item, self-report inventory designed to provide an overall rating of disability and ratings of specific disabilities related to seven areas of life activities: (1) family and home responsibility, (2) recreation, (3) social activity, (4) occupation, (5) sexual behavior, (6) self-care, and (7) life-support activity. Patients rate their level of disability in each of these areas on a scale ranging from 0 (no disability) to 10 (total disability).<sup>10</sup> A factor analysis of the PDI revealed that the scale was comprised of two separate factors. Factor 1 (items 1 to 5) was conceptualized as representing voluntary or discretionary activities, whereas factor 2 consisted of items assessing self-care and life-support activities.<sup>6</sup> For the purpose of this study, factor scores were computed from PDI items and used as separate measures of disability.

The BDI and the Spielberger STAI are well-validated self-report instruments, widely used in clinical and research settings. They were included as part of the overall assessment package to provide standardized measures of psychologic distress.

Patients monitored their pain intensity (0 to 10 scale) and medication use on an hourly basis for seven days before their clinic appointment. Pain ratings were summed and averaged to yield a mean pain-intensity rating. Medication data were used to categorize patients into two groups: patients who used

### Matrix Correlating PDI Factors With Variables Assessed

	PDI factor 1	PDI factor 2
BDI	.42 <sup>†</sup>	.24 <sup>*</sup>
STAI	.24 <sup>*</sup>	.23 <sup>*</sup>
Pain	.57 <sup>†</sup>	.44 <sup>†</sup>
Chronicity	-.19	-.14
Medications	.35 <sup>†</sup>	.30 <sup>†</sup>
Employment	-.46 <sup>†</sup>	-.06
Surgeries	.18	.02

\* $p < .05$ ; <sup>†</sup> $p < .01$

narcotics or minor tranquilizers, and patients who did not use these medications.

The following variables were selected from the comprehensive interview form as being relevant to the purposes of this study: (1) chronicity of current pain complaint (measured in number of months), (2) current employment (working full-time vs not working full-time), and (3) whether or not the patient had undergone a surgical procedure secondary to the current pain complaint.

Data analysis included two steps. First, a matrix of Pearson product-moment correlations was computed to investigate the linear relationship between PDI factor scores and the measures of psychologic distress (BDI and STAI), pain intensity, medication use, and relevant variables from the comprehensive interview form. The second step was to investigate significant relationships between PDI factors and these variables while controlling for the level of pain intensity by the use of partial correlations.

## RESULTS

Correlations between PDI factor scores and measures of psychologic distress, pain intensity, medication use, and relevant variables from the interview form are provided in the table. As can be seen by examining these correlations, both PDI factor scores are significantly related to measures of psychologic distress (BDI and STAI), pain intensity, and the use of narcotic or minor tranquilizing medications. More specifically, correlations are greater for PDI factor 1 (discretionary activities) than for PDI factor 2 (obligatory activities). Additionally, PDI factor 1 is significantly related to employment status, while PDI factor 2 is not.

These results suggest that PDI factor scores are related in a consistent manner to other meaningful variables which have been used to assess functional status in chronic-pain patients. These data further suggest that the discretionary-activity factor may be more relevant than the obligatory-activity factor for use in disability screening in an outpatient chronic-pain population.

An examination of the table reveals that both PDI factor 1 and PDI factor 2 are more highly correlated with pain intensity than with any of the other variables assessed, i.e.,  $r = .57$ ,  $p < .01$  and  $r = .44$ ,  $p < .01$ , respectively. This pattern of results suggests the relationship between PDI factor scores and the other variables assessed may simply be a function of a shared relationship with pain intensity. To examine the pattern of relationships between PDI factor scores and other relevant variables while controlling for the level of pain intensity, partial correlations were computed for all of the significant relationships reported in the table.

The results indicated that PDI factor 1 scores were significantly related to BDI scores ( $r = .34, p < .01$ ), use of narcotic or minor tranquilizing medications ( $r = .28, p < .01$ ), and employment status ( $r = -.47, p < .0001$ ). PDI factor 2 scores were significantly related only to use of narcotic or minor tranquilizing medications ( $r = .23, p < .05$ ). Thus, independent of level of pain intensity, higher scores on PDI factor 1 were related to increased levels of depression, the use of narcotic or minor tranquilizing medications, and lack of employment. Higher scores on PDI factor 2 were related to use of narcotic or minor tranquilizing medications.

## DISCUSSION

PDI factor scores showed a significant relationship with other variables that have frequently been used to assess the functional status of chronic-pain patients, e.g., employment status, medication use, pain intensity, depression, and anxiety. Both factor scores showed similar patterns of relationships with these variables; however, PDI factor 1, which assesses level of disability for discretionary activities, was more strongly and consistently related to other meaningful measures of functional activity. Thus, factor 1 is likely to be more relevant to assessment of disability in an outpatient chronic-pain population than factor 2, which assesses self-care and life-support activities. The results confirm and expand the criterion-validated data provided by Tait and colleagues<sup>11</sup> and illustrate the PDI's usefulness in reflecting the multidimensional aspects of disability, including pain behavior measures as well as psychologic distress.

The strong relationship between PDI and pain intensity is consistent with findings by Tait and colleagues<sup>11</sup> for the PDI. The relationship between disability and pain level has also been reported for other measures of disability.<sup>14</sup> However, the partial correlation analyses provide the first evidence of the PDI's relationship to disability independent of pain intensity. Level of disability, as assessed by PDI factor 1, was related to employment status, medication use, and depression. This is an important finding because it demonstrates that the PDI provides meaningful information beyond what is routinely gathered by asking patients to rate levels of pain intensity. The fact that the significant zero-order correlation between PDI scores and STAI scores became nonsignificant when pain intensity was partialled from the relationship points to the importance of examining multiple factors (e.g., pain intensity)

when attempting to establish the construct validity of a new instrument.

## CONCLUSION

These data suggest that the PDI is a useful, valid, and time-efficient screening measure of disability that may provide meaningful information during the initial assessment of chronic-pain patients. Further research is needed to assess the PDI's ability to measure change in response to medical, physical or psychologic therapy.

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