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The Short Form of the Beck Depression Inventory: Validity Issues with Chronic Pain Patients

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Abstract:

Objective: To investigate the validity of the Beck Depression Inventory short form when used to screen for depression in chronic pain patients.

Setting: A multidisciplinary pain management center located in a major university medical center.

Patients: Seven hundred sixty-five persons presenting for evaluation of chronic pain, including low back pain, head/neck pain, and extremity pain.

Measures: Beck Depression Inventory short form, McGill Pain Questionnaire, Pain Disability Index, pain drawing, and Quality of Life Scale.

Results and Conclusions: Items on the Beck Depression Inventory short form reflecting pain-related interference with function (i.e., disability) were endorsed to a greater degree than affective and cognitive items. A factor analysis of the inventory yielded two affective/cognitive factors and one "disability" factor (work inhibition and fatigue). The correlations between the factor scores and the Pain Disability Index suggested that endorsement of the work inhibition and fatigue items by chronic pain patients may not be indicative of affective disturbance. The results suggest that these items should be evaluated critically for their contribution to the total score of the Beck Depression Inventory short form when assessing depression in chronic pain patients.

Key Words: Chronic pain-Depression-Assessment.

A number of studies have documented the tendency for standardized measures of depression to overestimate the prevalence of depression in medical patients (1-7), a phenomenon attributed to the inclusion of "somatic" items in depression inventories. While the incorporation of somatic symptoms (e.g., sleep disturbance, fatigue, anergia) is consistent with current definitions of depression, it can confound the assessment of patients with so-

matic disorders, where endorsement of these items may be independent of affective disturbance.

In a recent article, Williams and Richardson (7) addressed the validity of the Beck Depression Inventory (BDI) (8) for assessing depressive symptomatology in 207 chronic pain patients in the United Kingdom. The authors found that the "somatic" items of the BDI were preferentially endorsed by their sample. In addition, a factor analysis identified three factors: "sadness about health," "self-reproach," and "somatic disturbance." The first two factors correlated significantly with measures of anxiety and depression-related pain cognitions but were unrelated to measures of physical performance. The opposite pattern of correlation emerged for the "somatic disturbance" factor.

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These findings led the authors to conclude that the use of the total BDI score to assess depression in chronic pain patients "may give a misleading impression of the nature and degree of affective disturbance in this group of patients" (p. 259).

A similar cautionary note was sounded by Volk et al. (6) in a study using the BDI short form (BDI-SF) (9) with a U.S. sample of 598 family practice patients. The BDI-SF is an abbreviated version (13 items) of the standard BDI (21 items). They reported a two-factor model for the BDI-SF ("non-somatic" and "somatic") that was conceptually similar to the solution reported by Williams and Richardson (7). Volk et al. (6) concluded that endorsement of somatic items by medical patients contributed to a high (approximately 20%) false-positive rate in the identification of clinically significant depression.

The purpose of the present study was to extend the work of Williams and Richardson (7) and Volk et al. (6) to the use of the BDI-SF with chronic pain patients. Given the results of the previous studies, it was anticipated that the "somatic" items of the BDI-SF would function in a manner distinct from the cognitive and affective items. Specifically, we expected that (a) "somatic" items would be endorsed with a greater frequency than cognitive and affective items, and (b) a multifactor solution would emerge that included both cognitive/affective and "somatic" factors. We also explored the relationship between the BDI-SF and indicators of pain intensity, pain extent, pain-related disability, and quality of life.

METHODS

Subjects

Data were collected from 917 patients who presented for evaluation at a multidisciplinary pain treatment center over a 5.5-year period (January 1987 to June 1992). Of this total, 765 patients (83%) completed all items on the BDI-SF. The resulting sample was 51.4% female, with an average age of 44.7 years ($SD = 13.7$ years; $n = 745$). Accidents were the primary cause of pain (64.4%), followed by surgery or illness (9.2%); the remainder of the sample (26.4%) had pain of unknown origin. Most patients were not working or receiving work-related benefits (38.4%); 26.9% were working, 19.8% were on Worker's Compensation, and 14.9% were legally disabled. Nearly one-third of the sample (30.3%) was involved in litigation related to the pain condi-

tion. The average duration of the pain problem was 59.8 months ($SD = 82.1$ months; $n = 739$). The primary site of pain included the low back with radiation to lower extremities (63.1%), low back (11.6%), lower extremities (9.0%), head/neck/upper extremities (9.0%), upper extremities (3.9%), head/neck (1.6%), and other sites (e.g., chest, abdomen, groin) (1.7%).

Materials and procedure

All patients were asked to complete a questionnaire packet prior to evaluation at the treatment center. The packet included the BDI-SF, which comprises 13 items, each scored on a 4-point scale; a total score is computed by summing the item values, with higher scores indicating more depression (score range, 0–39) (see the Appendix). The BDI-SF was originally developed by Beck and Beck (9) as a brief screening test for depression in outpatient medical practice settings. Early studies (9,10) found it to have a very high correlation with the BDI long form and similar levels of association to clinician ratings of depth of depression. In the treatment center from which the current sample was drawn, the BDI-SF is used as a screening instrument for depression. All patients are also seen for a psychological interview; those with pathognomic indicators on the BDI-SF are assessed in more detail during the interview.

In addition to the BDI-SF, the packet contained the Pain Disability Index (PDI) (11–13), a measure of the extent to which pain interferes with everyday functioning; the adjective checklist of the McGill Pain Questionnaire (MPQ) (14), a measure of pain intensity; a pain drawing, which yielded a percentage of painful body surface or pain extent (PEXT) (15,16); and the Quality of Life Scale (QOLS), a measure of current satisfaction with various life areas (17).

RESULTS

Item endorsement

The mean BDI-SF total score was 10.8 ($SD = 6.5$). Table 1 displays the item results. The most frequently endorsed items (i.e., the items with the highest percentages of nonzero scores) reflected work inhibition (93.5%), fatigue (90.5%), and dissatisfaction (89.0%). Items concerning pessimism, mood, and indecisiveness were endorsed by 65.7, 59.6, and 56.1% of the sample, respectively. All of

TABLE 1. BDI-SF item means/standard deviations and distribution of scoring

| Item | M | SD | Percentage scoring | | | |
|----------------------|------|------|--------------------|------|------|------|
| | | | 0 | 1 | 2 | 3 |
| 1. Mood | 0.87 | 0.90 | 40.4 | 39.6 | 12.7 | 7.3 |
| 2. Pessimism | 0.90 | 0.84 | 34.2 | 48.2 | 10.8 | 6.7 |
| 3. Sense of failure | 0.42 | 0.74 | 70.3 | 19.7 | 7.5 | 2.5 |
| 4. Dissatisfaction | 1.25 | 0.78 | 11.1 | 62.4 | 16.5 | 10.1 |
| 5. Guilt | 0.49 | 0.81 | 66.7 | 21.4 | 7.7 | 4.2 |
| 6. Self-hate | 0.65 | 0.80 | 54.0 | 29.4 | 14.5 | 2.1 |
| 7. Suicide | 0.31 | 0.54 | 72.7 | 24.4 | 2.4 | 0.5 |
| 8. Social withdrawal | 0.61 | 0.77 | 54.8 | 30.7 | 13.1 | 1.4 |
| 9. Indecisiveness | 0.87 | 0.87 | 43.9 | 27.2 | 27.2 | 1.7 |
| 10. Body image | 0.65 | 0.89 | 60.4 | 18.0 | 18.2 | 3.4 |
| 11. Work inhibition | 1.75 | 0.82 | 6.5 | 29.8 | 46.3 | 17.4 |
| 12. Fatigue | 1.47 | 0.76 | 9.5 | 41.2 | 42.1 | 7.2 |
| 13. Appetite | 0.57 | 0.81 | 59.6 | 26.9 | 10.1 | 3.4 |

the remaining affective and cognitive items were endorsed by less than 50% of the sample.

Factor structure

A factor analysis of the 13 BDI-SF items was done using a principal-axis extraction method (common variance approach) with an orthogonal varimax rotation. The purpose of the factor analysis was to identify the latent dimensions or constructs represented by the BDI-SF items when used in a chronic pain population. Inspection of eigenvalues and the scree plot suggested a three-factor solution that accounted for 44.2% of the variance. Table 2 displays the solution reflecting a minimum loading criterion of 0.40. Items 10 (body image) and 13 (appetite) did not load on any factor. Factors 1 ("self-reproach") and 2 ("sadness regarding health") reflected affective and cognitive symptoms of depression. Factor 3 suggested pain-related interference with function or, more simply, a "disability" component. Three scores were calculated by summing the items contained in each factor. The mean item score for each factor (weighted by the number of items in the factor) was 0.62 (SD = 0.63), 0.78 (SD = 0.57), and 1.61 (SD = 0.67), respectively. The internal consistency of the BDI-SF (Cronbach's α), excluding items 10 and 13, was 0.86.

BDI-SF correlations with other measures

Partial correlation coefficients were calculated between the BDI-SF scores and the MPQ, PEXT, PDI, and QOLS. A partial correlation approach was chosen in recognition of the significant zero-order correlations among the variables. Thus, only the unique variance in the BDI-SF and a given measure was considered in the correlation.

The sample for the analysis was restricted to all subjects without missing data on the MPQ, PDI, PEXT, and QOLS. This methodological necessity resulted in a 27% decrease in sample size. Using *t* tests, comparisons were made on the BDI-SF total score and item scores between groups of patients with (*n* = 206) and without (*n* = 559) missing data. The analyses revealed a small but significant difference for item 5 (guilt) [$t(763) = -2.1, p < 0.05, \eta^2 = 0.006$], with the missing-data group scoring slightly lower (*M* = 0.40, *SD* = 0.74) than patients without missing data (*M* = 0.53, *SD* = 0.83).

Based on the factor solution, it was predicted that of the four BDI-SF scores, only the "disability" factor would correlate significantly with the PDI. Consistent with Williams and Richardson (7), we expected no relationship between the BDI-SF scores and pain intensity as measured by the MPQ. As suggested by previous research, little or no relationship was expected between PEXT and the BDI-SF scores (18), while a strong relationship was expected between the QOLS and these scores (17).

As shown in Table 3, there were very small associations among the total score, factor 1, factor 2, and the MPQ. No significant effects emerged for PEXT. The PDI had no association with factor 1, very weak correlations with the total score and factor 2, and a moderately strong relationship with factor 3. The QOLS correlated significantly with all BDI-SF scores.

DISCUSSION

The results of the present study support the conclusions of previous research documenting the dif-

TABLE 2. Loadings for three-factor solution

| Item | Factor | | |
|----------------------|-----------------|---------------------|--------------|
| | "Self-reproach" | "Sadness re health" | "Disability" |
| 6. Self-hate | 0.73 | | |
| 3. Sense of failure | 0.69 | — | — |
| 5. Guilt | 0.66 | — | — |
| 2. Pessimism | 0.42 | — | — |
| 8. Social withdrawal | — | 0.62 | — |
| 1. Mood | — | 0.55 | — |
| 9. Indecisiveness | — | 0.55 | — |
| 7. Suicide | — | 0.46 | — |
| 4. Dissatisfaction | — | 0.43 | — |
| 11. Work inhibition | — | — | 0.72 |
| 12. Fatigue | — | — | 0.50 |

Percentage of variance; Factor 1, 35.8%; Factor 2, 5.8%; Factor 3, 2.6%. Items 10 (body image) and 13 (appetite) did not load on any factor and are not shown.

TABLE 3. *Partial correlations of BDI-SF and measures of pain intensity, pain extent, disability, and quality of life*

| BDI-SF score | Pain intensity (MPQ) | Pain extent | Disability (PDI) | Quality of life (QOLS) |
|-------------------------------|----------------------|-------------|-------------------|------------------------|
| Total BDI-SF | 0.16 ^b | 0.04 | 0.15 ^b | -0.52 ^b |
| Factor 1. "Self-reproach" | 0.16 ^b | -0.00 | 0.00 | -0.42 ^b |
| Factor 2. "Sadness re health" | 0.15 ^b | 0.02 | 0.07 ^a | -0.50 ^b |
| Factor 3. "Disability" | 0.05 | 0.03 | 0.40 ^b | -0.29 ^b |

N = 559; for QOLS, lower scores mean a lower quality of life.

^a *p* < 0.05.

^b *p* < 0.001.

ferential validity of the BDI across different patient populations. Consistent with the present results, Williams and Richardson (7) found that items on the standard BDI indicative of work inhibition and fatigue were endorsed more frequently by chronic pain patients than items representing cognitive/affective symptoms of depression. Their factor analysis yielded a "somatic disturbance" factor that included work inhibition and fatigue items (in addition to appetite loss, weight loss, and sleep disturbance, the latter two of which do not appear on the short form). In the present study, appetite loss did not load with work inhibition and fatigue, suggesting less of a somatic component and more of an interference or "disability" component. This "disability" factor was unrelated to the affective and cognitive components of the BDI-SF but was significantly associated with the PDI, a measure of pain-related interference in role function, including occupation. It is interesting to note that in the Williams and Richardson (7) study, the "somatic disturbance" factor, but not the cognitive/affective factors, correlated significantly with physical performance measures (walking and stair climbing). Of the items that made up the somatic disturbance factor, work inhibition, fatigue, and sleep disturbance had the highest levels of endorsement, all of which could be construed as indicators of or contributors to pain-related interference in function; in fact, two of the three appear as items on the PDI (as "occupation" and "basic life-support" activities). Thus, it may be argued that the "somatic" factor of Williams and Richardson (7) comprised elements of disability, which would help to explain its significant correlation with physical activity measures.

Contrary to the work of Volk et al. (6) using the BDI-SF with medical patients, the factor analysis reported in the present study yielded three factors rather than two. However, the discrepancy involved the number of cognitive/affective factors; the "somatic symptoms" factor of Volk et al. was

consistent with that reported here with the exception of appetite loss (which loaded on both factors of Volk et al.). Again, it may be more appropriate to construe work inhibition and fatigue as indicators of illness-related interference or disability rather than "somatic symptoms." In any event, the cautionary note sounded by these researchers also appears to apply in the case of chronic pain patients: Endorsement of "disability" items on the BDI-SF form may contribute to a false-positive indication of depression.

The correlation between the "disability" factor and the PDI suggests that the work inhibition and fatigue items reflect functional limitations imposed by the pain condition rather than level of depression. Given the fact that nearly 75% of the present sample was not working due to pain, it would not be surprising for items reflecting work inhibition and fatigue to be heavily endorsed, irrespective of depression. These results are worth discussing in light of the conclusions drawn by Crisson et al. (19). They found that low-back pain patients preferentially endorsed "somatic" BDI items relative to cognitive items regardless of the extent of identifiable physical pathology, suggesting that responses to the somatic items are not "confounded by physical symptoms related to underlying tissue pathology." If, however, work inhibition and fatigue are construed as representing "disability" rather than "somatic disturbance," endorsement of these items does appear to be confounded by the patients' perceptions of the impact of the pain on their functional behavior. While the extent of verifiable physical pathology was not measured in the present study, the literature suggests that, in the case of chronic pain patients, there is little reason to expect physical pathology to correlate substantially with measures of pain intensity or functional behavior (20).

There are several noteworthy limitations to the present results. First, the sample comprised pa-

tients who were referred to a multidisciplinary pain center for the management of intractable pain. Thus, they may differ in systematic ways from pain patients whose care and treatment are managed by their primary physicians. Second, there was a substantial reduction in sample size for the partial correlation analyses. Although there appeared to be little or no difference in BDI scores between the patients who were included in the analysis and those who were not, the effect sizes and significance levels for the correlations could have been different had the entire sample provided complete data sets. Finally, the present study did not allow for an estimate of the relationship between endorsement of "disability" items on the BDI-SF by pain patients and the rate of false-positive indications of depression. Future research is needed to address this important clinical issue.

CONCLUSIONS

The results suggest that the BDI-SF may have reduced validity as an indicator of depressive symptomatology when used with chronic pain patients. Given the nature of the presenting complaint (e.g., low back pain), the endorsement of disability items by such patients may be independent of their level of affective disturbance. The factor analysis of the inventory indicated that the work inhibition and fatigue items assess a separate, nonaffective dimension that we have labeled "disability." Moreover, this factor appears to account for very little of the variance in the inventory. Together, these findings caution against giving equal weighting to these items in a total score that purportedly measures affective disturbance. Consistent with Williams and Richardson (7) and Volk et al. (6), it appears advisable in clinical practice with chronic pain patients to evaluate separately the contribution of the work inhibition and fatigue items to the total score of the BDI-SF.

APPENDIX: BDI-SF

Circle the number beside the statement in each group that best describes the way you have been feeling in the past week, including today.

1. 0 I do not feel sad.
1 I feel sad.
2 I am sad all the time and I can't snap out of it.
3 I am so sad or unhappy that I can't stand it.

APPENDIX —(Continued)

2. 0 I am not particularly discouraged about the future.
1 I feel discouraged about the future.
2 I feel I have nothing to look forward to.
3 I feel that the future is hopeless and that things cannot improve.
3. 0 I do not feel like a failure.
1 I feel I have failed more than the average person.
2 As I look back on my life, all I can see is a lot of failure.
3 I feel I am a complete failure as a person.
4. 0 I get as much satisfaction out of things as I used to.
1 I don't enjoy things the way I used to.
2 I don't get real satisfaction out of anything anymore.
3 I am dissatisfied or bored with everything.
5. 0 I don't feel particularly guilty.
1 I feel guilty a good part of the time.
2 I feel quite guilty most of the time.
3 I feel guilty all of the time.
6. 0 I don't feel disappointed in myself.
1 I am disappointed in myself.
2 I am disgusted with myself.
3 I hate myself.
7. 0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.
8. 0 I have not lost interest in other people.
1 I am less interested in other people than I used to be.
2 I have lost most of my interest in other people.
3 I have lost all of my interest in other people.
9. 0 I make decisions about as well as I ever could.
1 I put off making decisions more than I used to.
2 I have greater difficulty in making decisions than before.
3 I can't make decisions at all anymore.
10. 0 I don't feel I look any worse than I used to.
1 I am worried that I am looking old or unattractive.
2 I feel that there are permanent changes in my appearance that make me look unattractive.
3 I believe that I look ugly.

APPENDIX —(Continued)

-
- | | | |
|-----|---|---|
| 11. | 0 | I can work about as well as before. |
| | 1 | It takes an extra effort to get started at doing something. |
| | 2 | I have to push myself very hard to do anything. |
| | 3 | I can't do any work at all. |
| 12. | 0 | I don't get more tired than usual. |
| | 1 | I get tired more easily than I used to. |
| | 2 | I get tired from doing almost anything. |
| | 3 | I am too tired to do anything. |
| 13. | 0 | My appetite is no worse than usual. |
| | 1 | My appetite is not as good as it used to be. |
| | 2 | My appetite is much worse now. |
| | 3 | I have no appetite at all anymore. |

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