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Turkish Version of the Beck Anxiety Inventory: Psychometric Properties

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The Beck Anxiety Inventory (BAI) is proposed as an instrument to assess clinical anxiety and to discriminate anxious and nonanxious diagnostic groups. To study the discriminant validity of the Turkish version, we compared the BAI responses of four different diagnostic groups: a depressive patient group (major depression, dysthymic disorder) ($n = 31$); an anxious patient group (panic disorder, phobia, generalized anxiety disorder, etc.) ($n = 39$); a mixed patient group (major depression and panic disorder, etc.) ($n = 75$) and a control group of sexual dysfunction patients without depression and anxiety ($n = 32$). The one-way analysis of variance revealed that the BAI fared better in this study in discriminating the anxious patient group from the other groups, compared to the STAI. The BAI was moderately correlated with the Beck Depression Inventory (BDI), Hopelessness Scale (HS), Automatic Thoughts Questionnaire (ATQ), and the State-Trait Anxiety Inventory (STAI). The BAI showed a high internal consistency ($\alpha = .93$). The item-total correlations ranged from .45 to .72. The exploratory factor analysis using the principal components procedure yielded two factors. The results favor the use of the BAI as a reliable and valid measure of anxiety with Turkish psychiatric populations.

The importance of reliable and valid assessment instruments in psychology has always been recognized in making informed decisions for treatment planning, execution and evaluation of treatment. Within the new healthcare system, with its emphasis on continuous quality improvement, sensitive psychological

instruments will be in demand more than ever (Maruish, 1994). These instruments will, no doubt, assist the progress of basic research, which establishes the foundation on which these treatment programs are built.

One example of these basic research questions is the relationship between anxiety and depression, which continues to be an intriguing area of investigation and which is approached from different vantage points. While some researchers propose an interactional approach (Dobson, 1985), others point to the necessity of a diagnosis of mixed anxiety-depression disorder (Clark & Watson, 1991; Katon & Roy-Byrne, 1991), and another group suggests a continuum in the two disorders; anxiety preceding depression (Lesse, 1982). Some researchers approached the issue from a psychometric point of view, studying the performance of different diagnostic groups on the tests of anxiety and depression (Lipman, 1982). Such an approach also calls for the presence of reliable and valid measures of depression and anxiety, with unquestionable discriminative power.

The common theme appearing in the reviews of related literature centers on the problem of differentiating these disorders (Derogatis, Lipman, & Covi, 1972; Stavradi & Vargo, 1986), which points to issues of assessment. A review by Dobson (1985) reports a correlation of $r = .61$ between measures of anxiety and depression. These correlations approach a comparable level to the correlation of depression and anxiety measures among themselves (Tanaka-Matsumi & Kameoka, 1986). While these high correlations might be due symptom sharing between the two disorders, they may also be a reflection of a weakness inherent in the instruments that claim to measure the two constructs.

There are several ways of measuring depression and anxiety. A study which compared the commonly used measures of anxiety and depression revealed that, among the self-report symptom and syndrome measures, the Beck inventories fare better in terms of providing a more differentiated correlational pattern (Clark & Watson, 1991). The Beck Anxiety Inventory was developed on and for psychiatric patients. Items were selected with a strong emphasis on discriminating anxiety from depression. It was found to successfully discriminate anxious from depressed patients (Beck, Epstein, Brown, & Steer, 1988). Other empirical data on the inventory's reliability and validity with anxiety patients revealed that it discriminated better than the STAI (Fydrich, Dowdall, & Chambless, 1992). A study on nonclinical samples also showed that BAI is a powerful tool for measuring anxiety in university students (Borden, Peterson, & Jackson, 1991).

Cross-cultural data on psychological tests have undeniable value in tapping the essentials of these abstract constructs with which we deal in psychological research. The aim of this study is to investigate the BAI's psychometric properties and discriminative power in a different cultural setting, with the hope that the findings will constitute additional evidence for the universality of the construct it purports to measure.

METHOD

Subjects

The subjects were 177 psychiatric outpatients who had applied for treatment at the Bakirkoy State Mental Hospital Outpatient Clinic in Istanbul. There were 80 male (45.1% mean age = 33.3, $SD = 9.6$) and 97 female (54.8%, mean age = 32.1, $SD = 9.2$) patients. The patients were either self-referred or referred by other professionals.

Clinical Evaluation

The Turkish version of the Structured Clinical Interview for DSM-III-R (Sorias et al., 1988a) was used to aid in arriving at a diagnosis. The SCID provides a standardized format for questioning patients about their symptoms; the sequence of questions approximates the Diagnostic and Statistical Manual of Mental Disorders decision rules (DSM-III-R; American Psychiatric Association, 1987). An intensive, face-to-face interview was performed with each patient by the first author who was trained in the use of the Turkish version of the SCID and who was blind to the results of the self-report measures. The patients who were blind to the purpose of the study were assigned to the different study groups according to their SCID diagnosis. The approximate interview length was 45-120 minutes.

The first diagnostic group was composed of 31 depressive patients (17 females, 15 males), 27 with major depression, and 4 with dysthymic disorder. The second group was the anxious patients group ($n = 39$) (23 females, 16 males), with 14 patients who had panic disorder with agoraphobia 2 with social phobia, 11 with obsessive-compulsive disorder, 11 with panic disorder and 1 patient with agoraphobia. The third (mixed anxiety-depression) group ($n = 75$) (54 females, 21 male) was composed of patients with both depression and anxiety symptoms.

The fourth group was included in the study as a control group and consisted of patients who had sexual dysfunction. This was an all-male patient group without the clinical symptoms of depression and anxiety ($n = 32$); 8 were diagnosed as having premature ejaculation, 20 were diagnosed with male erectile disorder and 4 were diagnosed with hypoactive sexual desire disorder.

Self-Report Measures

Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988). This is a 21-item self-report inventory that measures the severity of anxiety in psychiatric populations. Clients rate the items according to how much have been are bothered by the particular symptom over the past week; each item is rated on a 4-point scale ranging from 0 (not at all) to 3 (severely—I could barely stand it). The score range is between 0-63. BAI focuses predominantly on the

physiological aspect of anxiety. Four of the 21 items are anxious mood terms; 3 items assess specific fears; the remaining 14 items assess the symptoms of autonomic hyperactivity and motor tension generalized anxiety disorder and panic. Beck Epstein et al. reported excellent internal consistency (Cronbach alpha = .92) and a 1-week retest reliability coefficient of $r = .75$.

The BAI was translated into Turkish by three independent psychologists with PhDs and was back-translated by three different instructors from the English Department at Bilkent University. The translations were remarkably similar and a final Turkish BAI was developed with items, the wording of which best matched the English form.

Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). This is a widely used 21-item self-report inventory that measures the presence and severity of affective, cognitive, motivational, psychomotor, and vegetative manifestations of depression (Beck et al., 1988). The items are summed to obtain a total score that can range from 0 to 63.

The psychometric properties of the instrument (1978 version) were studied in the Turkish culture. It was found to have acceptable reliability; split-half reliability over the odd-and even-numbered items was $r = .80$ and Cronbach's alpha was .74. Its concurrent validity with the adapted Turkish version of the Minnesota Multiphasic Personality Inventory-Depression (MMPI-D) ranged between .63 and .50 on student and psychiatric samples, respectively (Hisli, 1988).

State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970). This two-scale inventory was developed to provide a separate operational measurement for both "state" (STAI-S) and "trait" (STAI-T) anxiety. Each scale contains 20 items that indicate the presence or the absence of anxiety symptoms. The STAI-S instructs subjects to rate themselves specific to the time of test administration whereas the STAI-T assesses the severity of anxiety symptoms as the respondent generally feels them. The STAI was originally developed for use with normal populations. The validity and reliability of the translated versions of both scales for the Turkish culture have been documented in several studies (Oner & LeCompte, 1985). The STAI was included in this study as a criterion measure, since it was the only anxiety scale that was standardized for the Turkish culture.

Beck Hopelessness Scale (HS; Beck, Weissman, Lester, & Trexler, 1974). The Hopelessness Scale is a self-report instrument containing 20 true-false items assessing the presence of a negative expectation for the future. In a sample of 294 hospitalized patients who had made suicide attempts, the Kuder-Richardson reliability coefficient was found to be .93, and the item-total correlations ranged between .39 and .76. Moderately high correlations ranging from .56 to .68 between the HS and BDI have been reported in a number of studies with samples of inpatients, hospitalized suicide attempters (Minkoff, Bergman, Beck, & Beck, 1973), and depressed patients (Beck et al., 1975).

The Turkish HS was found to have good reliability, with a Cronbach's alpha of .85. Its correlation with the Turkish BDI was .71 in depressed patients and .68 in suicide attempters (Durak, 1993). This scale, as an independent measure of depressive cognition, was included in the present study in order to compare its correlations with the BDI and the BAI, with the hypothesis that the latter correlation would be lower.

Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980) This is a 30-item self-report inventory designed to assess the frequency of occurrence of particular thoughts associated with depression. The scoring range is 3-150.

The ATQ was adapted for the Turkish culture and has a split-half reliability of .91; internal consistency of (Cronbach's alpha) is .93. Its correlation with the BDI was .75 (Sahin & Sahin, 1992). This scale was included for the same reasons as the HS, since it is a measure of depressive, negative thoughts. The hypothesis was that its correlation with the BDI would be higher than its correlation with the BAI.

Procedure

After the initial interview with the clinical psychiatrist, the patients were administered the Beck Anxiety Inventory (BAI), the Beck Depression Inventory (BDI), the Hopelessness Scale (HS), the Automatic Thoughts Questionnaire (ATQ) and the State-Trait Anxiety Inventory (STAI). During the test administration, the order effect was controlled by mixing the order in which the scales were presented to the subjects.

RESULTS

Reliability

To assess the internal reliability Cronbach's alpha was computed for responses to the BAI. It was found to be internally consistent, $\alpha = .93$. This finding was comparable to those mentioned in the literature (Beck, Steer, & Garbin, 1988; Borden, Peterson, & Jackson, 1991; Fydrich, Dowdall, & Champless, 1992). The item-total correlations ranged between .46 and .72.

In order to test for other sources of variation, a 4(age) x 2(gender) x 4(group) ANOVA was conducted. This analysis revealed a significant main effect for group only; $F(3, 141) = 44.069, p < .0001$.

Validity

Concurrent Validity. The correlations of the BAI with a set of self-report depression and anxiety scales are shown in Table 1. The BAI correlations with the STAI-T and the STAI-S were .45 and .53, respectively ($p < 0.001$). The first is lower and the latter is higher than the findings of a previous study (Fydrich

et al., 1992). The BAI - BDI correlation was .46, which was found to be .48 and .50 in other studies (Beck et al., 1988; Fydrich et al., 1992).

In contrast to the higher STAI-S and STAI-T correlations with the BDI, which are .65 and .67, the lower BAI - BDI correlation of .46 seems more favorable. Additional support is found for the BAI's discriminant validity by observing the correlations between the Hopelessness Scale (HS) ($r = .34$) and the Automatic Thoughts Questionnaire (ATQ) ($r = .41$), other measures of cognitive dimensions of depression. The r values were converted into Fisher's z statistic and the resulting difference was subjected to significance testing. The differences between the BAI - BDI and STAI - BDI correlations and the differences between the BAI - HS, ATQ and the STAI - HS, ATQ correlations were all significant ($p < .01$). These lower correlations between the BAI and the depression measures put the BAI at an advantage compared to the STAI in terms of discriminant properties.

Construct Validity. In order to obtain the construct validity of the Turkish version of the BAI, a three-step factor analysis was conducted. In the first step, the 21 BAI items were subjected to principal components analysis. According to the "eigenvalue greater than one" criterion, initially 4 factors were extracted which accounted for 61.2% of the total variance. The scree plot test indicated that 2 factors would be appropriate. In the next step, a 2-factor solution was conducted (Table 2). These two factors were labeled as "subjective anxiety" (items: 1, 4, 5, 7, 8, 9, 10, 11, 14, 15, 16, 17, 19), and "somatic symptoms" (items: 2, 3, 6, 12, 13, 18, 20, 21) (Table 1). The first and second factors accounted for 42.1% (eigenvalue = 8.91) and 7.8% (eigenvalue = 1.64) of the total variance, respectively. Correlation between the two factors was .73 ($p < 0.001$).

The second factor analysis was performed on a total of 42 items (21 BAI items and 21 BDI items). The researchers were interested to see if these two, supposedly different, measures could be differentiated through this procedure. The Varimax rotation yielded a four-factor solution. Three factors consisted of the BDI items and one factor consisted of the BAI items, which is another indication of the homogeneity of the BAI. The scree plot test indicated that two factors would be appropriate. Therefore a third analysis was conducted by forcing the items into a two-factor solution. The first factor, accounting for 12.28 % of the variance, was comprised of all the BAI items. The second factor accounted for an additional 4.94 % of the variance and included all the BDI items.

Table 1. Intercorrelations Between the Dependent Measures

| ($n = 177$) | BAI | STAI-S | STAI-T | BDI | HS |
|---------------|-------|--------|--------|-------|-------|
| STAI-S | .53** | | | | |
| STAI-T | .45** | .67** | | | |
| BDI | .46** | .65** | .67** | | |
| HS | .34** | .62** | .63** | .63** | |
| ATQ | .41** | .60** | .68** | .75** | .63** |

** $p < 0.001$, two-tailed test.

Table 2. Comparison of the Depressed, Anxious, Mixed, and Control Groups Over the Dependent Measures

| Measure | Total patients N = 177 | | Anxious N = 39 | | Depressed N = 31 | | Mixed N = 75 | | Control N = 32 | | F ratio |
|---------|---------------------------|-------|--------------------|-------|---------------------|-------|--------------------|-------|--------------------|-------|----------|
| | M | SD | M | SD | M | SD | M | SD | M | SD | |
| BAI | 27.02 | 14.21 | 26.41 _a | 10.26 | 18.51 _b | 9.13 | 37.24 _a | 11.13 | 12.06 _b | 9.23 | 54.24*** |
| STAI-T | 49.68 | 11.24 | 43.48 _b | 9.94 | 52.93 _a | 8.05 | 55.42 _a | 8.7 | 40.62 _b | 11.26 | 3.76*** |
| STAI-S | 55.14 | 9.69 | 48.43 _b | 7.92 | 58.25 _a | 7.68 | 60.82 _a | 6.9 | 46.96 _a | 8.40 | 38.47*** |
| BDI | 24.75 | 12.39 | 12.07 _b | 5.84 | 32.12 _a | 9.68 | 32.26 _a | 8.53 | 15.46 _b | 9.12 | 71.32*** |
| HS | 8.94 | 5.53 | 4.33 _b | 3.60 | 11.19 _a | 4.54 | 11.86 _a | 4.90 | 5.53 _b | 4.00 | 33.96*** |
| ATQ | 73.32 | 24.68 | 52.25 _b | 12.78 | 89.32 _a | 23.76 | 85.13 _a | 20.75 | 55.81 _b | 14.66 | 42.54*** |

** $p < 0.001$, $df = 3, 173$.

Convergent and Discriminant Validity

In order to examine the discriminative power of the BAI for different diagnostic groups, a one-way analysis of variance was conducted on all measures, with post hoc Tukey tests at the .05 level. Although group differences were evident on all measures, Tukey's HSD revealed that the mean BAI was significantly higher in the mixed and the anxious groups (Table 3). A similar group difference was reported previously on the same scale by Beck et al. (1988). It can be seen that, while the BAI provides a more refined discrimination of differentiating between the "mixed," the "anxious," the "depressed" and the "control" groups, the other measures could significantly discriminate between the "mixed" and the other groups only.

A direct discriminant solution was employed using each instrument individually as predictors of membership in different diagnostic groups. For the BAI, the canonical correlation for the retained function was $r = .69$ (chi-square = 115.038; $p < .00001$). The percent of "grouped" cases correctly classified was 59.32%, whereas for the STAI-S ($r = .55$, chi square = 64.63; $p < .00001$) and the STAI-T ($r = .66$, chi square = 88.69; $p < .0001$) the correct classifications were 44% and 46.89% respectively. As these results indicate, a slightly higher canonical correlation and better correct classification rates were obtained for the BAI.

DISCUSSION

The results of this study indicate that the Turkish version of the BAI is a reliable and valid tool to assess anxiety with Turkish clinical samples. It appears to have better convergent and discriminant validity compared to STAI (both State

Table 3. Means, Standard Deviations, and Corrected Item-Total Correlations for BAI

| Item | BAI Items | <i>M</i> | <i>SD</i> | <i>r</i> | Factor Loading | |
|------|-----------|----------|-----------|----------|----------------|-----|
| | | | | | 1 | 2 |
| 1 | | 1.33 | 1.04 | .65 | .52 | |
| 2 | | 1.24 | .88 | .54 | | .79 |
| 3 | | 1.48 | .04 | .67 | | .61 |
| 4 | | 1.48 | 1.08 | .49 | .42 | |
| 5 | | 1.80 | 1.06 | .62 | .76 | |
| 6 | | 1.31 | .99 | .69 | | .56 |
| 7 | | 1.32 | 1.11 | .67 | .54 | |
| 8 | | 1.23 | 1.06 | .72 | .66 | |
| 9 | | 1.40 | 1.15 | .63 | .76 | |
| 10 | | 1.86 | .88 | .48 | .44 | |
| 11 | | 1.20 | 1.14 | .69 | .58 | |
| 12 | | 1.15 | 1.02 | .61 | | .52 |
| 13 | | .94 | 1.10 | .61 | | .52 |
| 14 | | 1.37 | 1.07 | .70 | .72 | |
| 15 | | 1.07 | 1.06 | .72 | .56 | |
| 16 | | 1.30 | 1.27 | .61 | .73 | |
| 17 | | 1.56 | 1.08 | .57 | .75 | |
| 18 | | 1.09 | 1.06 | .49 | | .59 |
| 19 | | .56 | .86 | .52 | .41 | |
| 20 | | 1.05 | .99 | .46 | | .67 |
| 21 | | 1.29 | 1.02 | .48 | | .68 |

and Trait Scales). The one-way analysis of variance revealed that only the BAI mean was significantly higher in the anxious group, compared to the other three groups.

The correlational analyses also supported our conclusion that the BAI is a better anxiety assessment tool than the STAI. The correlations between the STAI and the BDI were found to be greater compared to the correlations between BAI and BDI. These results are remarkably similar to the correlations reported by Tanaka-Matsumi and Kameoka (1986). The correlation between the BAI and the BDI reported in the present study is lower than that reported in the meta-analysis of Clark and Watson (1991).

According to the cognitive specificity model of Beck and Clark (1988), the content of thought in both emotions, dysphoria and anxiety, might be assumed to be the central discriminating factor. Depression and anxiety can clinically be separated from each other by the content of thoughts typically observed in these emotional states; anxiety associated more with a future-oriented, searching, struggling mode; and depression characterized by more of a past-oriented,

helpless, or in the case of suicide, a giving-up mode (Clark, Beck, & Stewart, 1990). If one follows this line of thinking, one would expect better anxiety measures to have lower correlations with instruments proposing to measure depressive cognition and/or suicidal ideation. The ATQ and the HS were included in this study with this assumption. The lower correlations of the BAI with both of these scales found in this study can be interpreted as another indication of its validity and better performance compared to the STAI.

It seems that the advantage of the BAI over the STAI might be explained by the differences in the content. The STAI measures various symptoms that are common to both depression and anxiety. It was reported that it has more items which measure depression-related symptoms (Gotlib & Cane, 1989). The emphasis given to the specifically subjective, somatic and cognitive experiences of anxiety in the BAI (Borden, Peterson & Jacobson, 1993) rather than depression might be the explanation for its advantage over the STAI to measure anxiety in the Turkish culture as well.

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