

Validation of the Nepali version of beck anxiety inventory

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This study validates a Nepali version of the Beck Anxiety Inventory (BAI). The instrument was compared against a gold standard diagnosis of generalized anxiety. The diagnosis of Generalized Anxiety Disorder (GAD) was made according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition. GAD subjects were selected both from outpatients at Tribhuvan University Teaching Hospital and a rural sample from Jumla. Healthy (non-psychiatric diagnosis) cases were taken from a community sample in Jumla; their “healthy” status was obtained by achieving a score less than 2 on the Nepali General Health Questionnaire-12. This study identifies acceptable sensitivity and specificity ranges for the measure. A cut-off of 13/14 for the BAI provides sensitivity of 0.91 and specificity of 0.89. Reliability for the BAI is comparable to most studies in Western countries (0.89). A factor analysis of the BAI evokes four factors. A number of items reduce the validity and internal reliability of this measure. Somatic items poorly distinguish psychiatric cases; this may be due to high burden of physical illness in rural Nepal. Overall, the BAI appears to be a good instrument for clinical and research use in Nepal.

Key Words: Validation, Nepali, Beck, Anxiety, TUTH.

Background

The Beck Anxiety Inventory (BAI) is a commonly used self-report measure of psychological distress. The BAI assesses the presence and severity of 21 symptoms over the past week. It requires approximately fifteen minutes to administer. The BAI was modeled after the Beck Depression Inventory¹ and designed to assess the severity of anxiety symptoms². Unlike the BDI, the BAI was developed from other scales rather than from clinical records. Beck attempted to design this scale to minimally overlap with depression. For interpretation, 0-9 is normal anxiety; 10-18 is mild to moderate anxiety; 19-29 is moderate-severe anxiety; and greater than 29 is severe anxiety³. Reviewing current literature, Wilson cites a median score of 19 for generalized anxiety patients while a score of approximately 11 was the median for a community sample with no psychiatric illness⁴. Internal consistency ranges from 0.90 to 0.94². Beck identifies four factors: neurophysiologic, subjective, panic, and autonomic symptoms². Other studies have found two factor solutions of subject/cognitive and somatic complaints⁵.

Most translations of the BAI in European languages have shown high reliability and validity. However, due to the variability in psychological symptoms and linguistic nuances, the scale does not directly translate in all foreign settings. For example, the BDI has been a poor identifier of depression in Vietnam, China, and Mexico^{6,7,8,9}. Since few studies have used the BAI cross-culturally, it requires validation due to cultural and linguistic differences. This study explores the applicability of the BAI when administered in Nepali.

Method

Instruments

Academic linguists originally translated the BAI. The instrument was then back-translated by a second group of linguists. The process of translation and back-translation continued until back translations matched the English original.

Sample

Four main populations were employed for this study: (1) an outpatient clinical population from Tribhuvan University Teaching Hospital in Maharajgunj (TUTH); (2) a community sample with psychiatric illness from the district headquarters in Jumla, (3) a community sample with no psychiatric illness from the district headquarters in Jumla, (4) a community sample from Jumla that did not receive psychiatric diagnoses. The Jumla area was chosen because it represents a remote rural population and the native language is Nepali. Therefore the interviews would not be conducted in a second language such as would have been necessary in a Tamang or Rai community. The outpatient clinical sample included both new and chronic cases from TUTH. These patients were diagnosed with generalized anxiety disorder (GAD) or mixed anxiety/depression according to DSM-IV criteria. An interviewer (BK) administered the Nepali translation of the BAI to the outpatients at TUTH (n=47). The community sample of psychiatric patients was obtained during a survey of mental health in Jumla (n=316). An interviewer (BK) collected full psychiatric

histories of a subset of subjects (n=43). Case histories were then presented in a blind fashion to a psychiatrist at TUTH (NK). This psychiatrist independently diagnosed the subjects. Individuals who received matching diagnoses of GAD, and mixed anxiety/depression from both the interviewer and the psychiatrist were then included in the study and given the BAI. The community sample of healthy individuals was selected based on low scores on the General Health Questionnaire (GHQ-12, see Nepalese Journal of Psychiatry 1(1) for a validation study of the Nepali version of the GHQ-12). The GHQ-12 was administered to the 316 persons in Jumla. All those who received scores of 1 or below on the GHQ-12 were classified as “no psychiatric illness” (n=98). Research assistants blind to the diagnoses and GHQ scores then administered the BAI to the community population. Informed consent was obtained from all subjects.

Statistical analysis

All analyses were completed with SPSS 10.0. Sensitivity and specificity analyses were conducted to compare BAI scores against the gold standard of DSM-IV diagnosis. Sensitivity of a symptom or scale is the probability that the symptom is present given that the person has a disease (e.g. the likelihood of having a BAI score above the cut-off criterion, given that a person has a DSM diagnosis of generalized anxiety). Specificity of a symptom or scale is the probability that the symptom is *not* present given that the person does *not* have the disease (e.g. the likelihood of having a BAI score below the cut-off criterion, given that the of generalized anxiety). Sensitivity and specificity for the BAI were analyzed with 42 generalized anxiety cases and 93 healthy cases combined from clinical and community interviews. Reliability for the BAI was assessed for both the diagnosed

anxiety group (n=42) and for all subjects who completed the BAI (n=340). Factor analyses were conducted on the total group of subject's person does *not* have a DSM diagnosis. *BAI scores:* Two groups were created for BAI analysis. The “healthy” group consisted of the 93 persons with low GHQ scores. The “anxiety” group included clinical cases of GAD and mixed anxiety/depression and community cases of GAD and mixed anxiety/depression (total n=42). The BAI score for the anxiety group (mean=23.1, SD=9.2) was significantly higher than the healthy group (mean=6.8, SD=5.25), $t(133)=-13.0$, $p<0.001$. T-tests on individual items identified group differences on 19 of the 21 items, $p<0.005$. Two items failed to show significant differences between the two groups. “Indigestion” was not significantly more common among the anxiety group (mean=0.8, SD=0.9) than the healthy group (mean=0.4, SD=0.8), $t(68.4)=-2.2$, $p=0.03$. The same was found for sweating in the anxiety group (mean=0.8, SD=1.0) and the healthy group (mean=0.3, SD=0.7), $t(61.1)=-2.5$, $p=0.02$. Sensitivity and specificity of BAI scores are displayed in figure 1 and table 2. Cut off scores ranging from 12 to 14 have values greater than 0.80.

Results

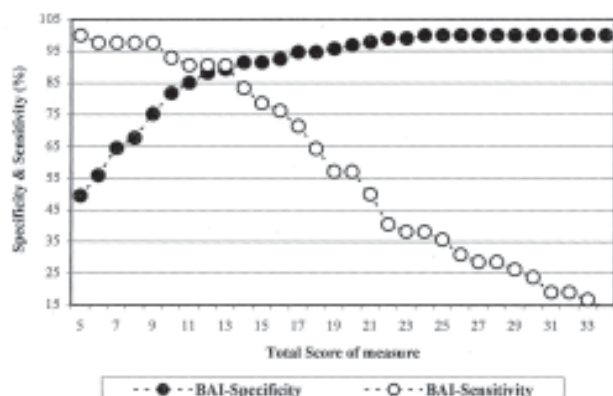
Demographics: Forty-seven outpatients participated in this study. In the Jumla community sample, 316 persons participated. From the Jumla community sample, 93 persons had GHQ scores below 2 and were thus labeled the “healthy” group. Seventeen community individuals received diagnoses and composed the psychiatrically ill group. See table 1 for demographic breakdowns based on diagnosis. Those who scored above 2 on the GHQ and did not receive full clinical interviews are excluded from the table.

Table 1: Demographic Characteristics

	Healthy (n=93)		Clinical-GAD (n=10)		Clinical-Mixed (n=15)		Community-GAD (n=5)		Community-Mixed (n=12)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	30.8	10.7	25.6	7.7	29.7	11.0	36.8	10.6	41.5	14.8
Education (years)	5.5	4.7	13.2	3.2	8.9	5.0	4.4	6.1	2.1	2.7
Income (rupiya)*	3909	4895	2450	1802	1980	1908	2720	3270	442	1042
BDI total score	9.1	6.3	x	x	20.9	7.7	21.0	9.2	24.3	5.4
BAI total score	6.7	5.3	20.3	8.8	24.6	7.6	28.8	12.6	21.3	9.8
	%		%		%		%		%	
Sex (female)	47		30		27		40		75	
Currently married	82		50		40		100		91	

Table 2: Specificity and Sensitivity Cut-off Scores

Cut-off score	BAI-Specificity	BAI-Sensitivity
12/13	0.88	0.90
13/14	0.89	0.91
14/15	0.92	0.83
15/16	0.91	0.79
16/17	0.92	0.76
17/18	0.95	0.71

**Figure 1:** Sensitivity and Specificity of BAI

When assessing reliability among the anxiety cases, the 21-items have an alpha of 0.80; the items with lowest item-total correlation were “feeling faint” ($r=0.16$) and “face flushed” ($r=0.07$). Reliability analysis of the full 340 subjects produced an alpha of 0.89. Sweating (item 21) had the lowest inter-item correlation ($r=0.36$ and $r=0.38$, respectively). An exploratory factor analysis identified four main factors with Eigenvalues greater than 2.0. Principal component analysis was performed with a varimax rotation and Kaiser Normalization. (The factors are listed in table 3.) The first factor includes primarily somatic/autonomic symptoms; the second includes cognitive items; the third is primarily somatic; the fourth appears to be a panic/autonomic factor.

Table 3: Factor scores for the BAI

Item (#)	Factor 1	Factor 2	Factor 3	Factor 4
Legs wobbly (3)	0.69	0.13	0.16	0.02
Hands tremble (12)	0.68	0.09	0.16	0.17
Nervous (10)	0.64	0.20	0.11	0.17
Unsteady (8)	0.63	0.23	0.22	0.18
Feel hot (2)	0.62	0.31	0.03	-0.09
Heart pounding (7)	0.55	0.39	0.12	0.19
Choking sensation (11)	0.48	0.09	0.04	0.39
Terrified (9)	0.22	0.81	0.09	0.13
Scared (17)	0.15	0.76	0.02	0.17
Fear of dying (16)	0.17	0.75	0.14	0.02
Numbness/tingling (1)	0.27	0.71	0.07	0.16
Fear of the worst (5)	0.06	0.59	0.44	0.00

Fear of losing control (14)	0.00	0.09	0.73	0.20
Indigestion (18)	0.11	0.14	0.66	0.12
Body shakes (13)	0.44	-0.03	0.56	0.21
Unable to relax (4)	0.39	0.12	0.55	-0.20
Dizziness (6)	0.42	0.18	0.44	0.30
Sweating (21)	-0.11	0.11	0.23	0.72
Face flushed (20)	0.36	0.05	-0.02	0.59
Faint (19)	0.21	0.18	0.22	0.46
Difficulty breathing (15)	0.38	0.39	0.03	0.43
Variance explained	17%	16%	10%	9%

Discussion

The BAI was validated in the Nepali language. The instrument shows good validity based on item differences, reliability, and factor scores. The BAI showed good specificity and sensitivity to DSM-IV diagnoses of generalized anxiety disorder. A cut-off of 13/14 correctly identifies 90% of cases and non-cases. Although the cut-off is low, specificities of at least 0.90 are achieved. The mean (23.1) for the anxiety group in this study is within the range of moderate to severe anxiety (19-29), while the healthy group has a mean (6.8) within the expected range for non-anxious persons (0-9)². Both “indigestion” and “sweating” failed to distinguish anxious from non-anxious persons. “Indigestion” may be a poor item for the overall health conditions in rural Nepal, i.e. chronic gastrointestinal disease reduces the ability for a somatic symptom to distinguish the groups. It is unclear why “sweating” is a poor item. Reliability for the BAI is slightly higher than for the Nepali-BDI (see validation of Nepali-BDI). Reliability among the psychiatric sample is 0.80 while reliability among the full sample is 0.89. A few items produced low inter-item correlations: “feeling faint,” “face flushed,” “sweating,” and “fear of losing control.” It is unclear why these items do not associate strongly. Translation and/or local biology and culture may affect the under and over-reporting of these symptoms.

There is some crossover between our four-factor model of the BAI and that identified by Steer¹⁰. Our first factor includes items from Steer’s neuropsychological and subjective component; the second includes primarily subjective items; the third is primarily neuropsychological, items in the fourth are comparable of Steer’s autonomic factor.

Recommendations for use of the Nepali BAI

This study is the first validation and community assessment of a Nepali version of the BAI. Despite cultural and linguistic differences, the instrument displays good sensitivity and specificity when compared with the gold

standard of DSM-IV diagnoses. A cut-off score of 13/14 for the BAI is suggested if one wants comparable specificity (0.89) and sensitivity (0.90). Cut-offs below 13/14 will increase sensitivity, thus including more of the cases that may be depressed, but it will also increase the number of false positive diagnoses. Cut-offs above 13/14 will be more specific and thus reduce the number of false positives but increase false negatives. It is recommended that for clinical trials a higher threshold be used to increase the probability that subjects have anxiety. For example of a cut-off of 17/18 would include less than 5% of non-cases. Conversely, it is suggested that for community epidemiological surveys 13/14 or a lower threshold be employed in order to capture the majority of anxiety cases. The BAI also displays acceptable inter-item reliability and expected factor structures. However, a number of items should be addressed when using the Nepali BAI in the future. The items "indigestion," "sweating," "face flushed," and "feeling faint" may impair the validity and reliability of the instruments. Retranslation of these items may increase their acumen in identifying psychologically distressed persons. Secondly, removal of some somatic items may be warranted because overall poor physical health especially in rural Nepal may inflate scores of psychological distress. A study among arthritis patients in Mexico removed somatic items from the BDI and subsequently improved specificity and sensitivity in identification of depression (Suarez-Mendoza et al. 1997). Ultimately, the Nepali-BAI is a useful tool for clinical and epidemiological applications.

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