

The Beck Anxiety Inventory for Malays (BAI-Malay): A Preliminary Study on Psychometric Properties

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ABSTRACT

Introduction: The purpose of the present study was to investigate exploratory factor analysis of the Beck Anxiety Inventory (BAI) and reports its reliability and validity in Malaysia. **Method:** One thousand and ninety participants from four different samples (namely students, general population, medical and psychiatric patients) completed the Malay version of Beck Anxiety Inventory, as well as additional questionnaires such as Fear Questionnaire, Anxiety Sensitivity Index, Depression Anxiety Stress Scale, and Catastrophic Cognition Questionnaire. **Results:** Exploratory factor analysis revealed a three factor solution and accounted for 48.01% of the total variance. The three-factor structure appeared to be; *subjective anxiety, autonomic, and neurophysiology*. The Cronbach alpha coefficients (α) ranged from 0.66 to 0.89 with satisfactory overall alpha value (.91). Evidence was also found acceptable concurrent validity of the BAI-Malay (range between $r=.22$ to $r=.67$). **Conclusion:** This study shows that the BAI-Malay is a reliable and valid instrument to measure symptoms of anxiety in the Malay population and can be used in research and clinical service in Malaysia. However, replication of study by using confirmatory factor analysis and application of the instrument among anxiety patients worth of further investigation.

Keywords: Beck anxiety inventory, Malay, reliability, validity, Malaysia

INTRODUCTION

The Beck Anxiety Inventory (BAI) is commonly used to measure the level of anxiety^[1] in adolescents and adults^[2]. The BAI was originally developed to differentiate the behavioural, emotional and physiological symptoms between individuals with anxiety and depression^[3] and to assess response to treatment of groups patients with anxiety disorders by clinicians and researchers to determine the cognitive and somatic aspects of the symptoms of anxiety^[4-8].

A large number of studies in the West have shown interest in the psychometric characteristics of the BAI with various populations, specifically clinical and non-clinical population^[9]. The psychometric properties including factor structure, reliability and validity of the BAI have been examined and researchers have found various finding for the scale. This may be due to the type of sample of the study as well as the analysis conducted by the researcher^[10]. Beck *et al.*, Hewit and Norton and Steer *et al.* found two factor structure of the BAI^[1, 4, 11] while others^[1, 7-8, 12-13] found that the BAI contained four and even six factors^[7].

Beck *et al.* conducted the first principal component analysis revealing two factors which were somatic and subjective anxiety and panic^[4]. The somatic factor contained 12 physical symptoms such as numbness and difficulty in breathing, while the subjective anxiety and panic factor included nine psychological symptoms including nervous, terrified and unable to relax. However, some item loadings were found to be rather low.

Beck and Steer performed another study using an exploratory factor analysis of the BAI in a sample of 393 outpatient adults^[14]. They reported that the BAI comprised of four factor structures which were termed neurophysiological, subjective, autonomic, and panic symptoms of anxiety. These factors contributed to approximately 59% of the total variance. These same factors were also studied by Steer *et al.* in a sample of 470 individuals with different psychological disorders^[15] and were found to produce similar results. Indigestion and heart pounding were the only items with a loading below 0.45.

Borden, Peterson and Jackson also conducted a study to validate the factor structure of the BAI with a sample of 293 undergraduates^[16]. Their analyses indicated that five factors emerged from the principal component analysis namely subjective fear (8 items), somatic nervousness (5 items), neurophysiological (5 items), muscular/motoric, and respiration (3 items). However, Borden *et al.* reported that some items loaded on more than one factor and they determined 26 items for the five factors BAI. However, they did not report the internal consistency estimates for the BAI.

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Various studies have found that the BAI has satisfactory reliability and validity in diversity of sample (e.g. psychiatric patient, adolescents with mental disorder, general population, university students) [17]. Osman *et al.* reported that the total BAI score was found to have high internal consistency ($\alpha=.92$) and one-week test-retest reliability ($r_n=.75$) in a sample of 83 adult psychiatric outpatients [12]. Their finding was further supported by the study done by Magán, Sanz, García-vera [17] who reported a reliability of alpha coefficient of .93 [17]. Their results were also replicated findings from previous studies [18-20].

Additionally, Osman *et al.* found that the BAI had support for convergent validity based on the correlation value with other self-report measures of anxiety [12]. Steer and Wilson *et al.* found that BAI total scores have moderate to high convergent validities ($r_s>0.50$) with other self-report and clinical rating scales of anxiety and moderate discriminant validities ($r_s<0.65$) with respect to instruments measuring other types of psychopathology in both psychiatric and nonpsychiatric populations [10, 21].

Although the efficacy of the BAI's general utility in clinical and non-clinical population is well established, very little is known about its use in Malaysian sample. After extensive review of important bibliography database up to January 2010, we have not found any study that specifically analyses the psychometric properties of the BAI-Malay translation. Therefore, it is the aim of this study to conduct an exploratory factor analysis to determine the factor structure, reliability and validity of the BAI among Malay population.

MATERIALS AND METHODS

Participants

Student sample. The subjects in this study were 315 undergraduate students from various faculties of two universities (medicine, dentistry, allied health sciences, and human sciences). Subjects participated voluntarily in this study to partially satisfy a research requirement of their course. All of the data for this study were collected through group administrators. Each subject was provided with a self-administered battery of questionnaires, with an explanation and accompanying directions for their use.

General community sample. Members of the general public participated in this study by completing questionnaires that had been randomly distributed in public places (shopping complexes, community complexes etc) by research assistants, and returning them in envelopes supplied.

Medical patients sample. The Malay medical patients recruited in this study were from primary care clinics, an obesity clinic, Ear, Nose and Throat (ENT) clinics, and primary care clinics. The medical patients participated in this study by completing questionnaires that had been distributed by research assistants, and returning them in envelopes supplied.

Patients with depression. Malay patients with depression were invited via mail, phone or through referral from psychiatrists who had been informed of the study. A letter of invitation and information regarding the study was provided and those participants who were willing to participate presented at the psychiatric clinic for the intake procedure assessment. Early diagnosis on depression was determined by psychiatrists using a structured clinical interview from the Diagnosis and Statistical Manual of Mental Disorder- Fourth Edition (DSM-IV) to ascertain participants' eligibility.

Subjects' data in all categories was discarded from the study if they were current drug or alcohol abusers, had a history of organically based cognitive dysfunction, demonstrated reading difficulties, were not fluent in Malay, or were non-Malays.

Measures

Demographic data sheet. Participants filled-up a demographic data sheet that consist of information on their personal background including age, gender and level of education.

Beck Anxiety Inventory. The BAI-Malay is a translated version of the original BAI [13] with 21 items that provide lists symptoms of anxiety. Participants respond to questions in relation to how much each symptom has bothered them over the past week, with higher scores indicating more severe anxiety symptoms. The symptoms rated on a four-point scale, ranging from "not at all" (0) to severely (3). The instrument has excellent internal consistency ($\alpha=.92$) and high test-retest reliability ($r=.75$) [13] in previous study.

Fear Questionnaire. Subjects responded to the 15-items Fear Questionnaire (FQ) [22] and their scores ranged from 0 to 120, yielding a "Total Phobia" score. The 15 items measure agoraphobia, blood injury, and social phobia. The scale ranges from 0 (would avoid it) to 8 (always avoid it) on situations that create uneasy feelings to the subjects such as eating with other people, hospital, walking alone and so forth.

Depression Anxiety Stress Scale-21. The Malay version of the Depression, Anxiety, Stress Scale-21 (DASS21)^[23] was based on the first instance on the original (English) version of the instrument. The English DASS21 is a 21-item instrument measuring current (“over the past week”) symptoms of depression, anxiety, and stress. Each of the three scales contains seven items. Subjects were asked to use a 4-point combined severity/frequency scale to rate the extent to which they have experienced each item over the past week. The scale ranges from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time). Scores for Depression, Anxiety, and Stress are calculated by summing the scores for the relevant items and multiplying by two. Musa^[23] reported good reliability and validity of DASS-21 to be used in Malaysian context.

Anxiety Sensitivity Index. The Anxiety Sensitivity Index (ASI)^[24] scale was developed to measure anxiety sensitivity, which was believed to be related to the development of anxiety disorders. The scale was shown to have sound psychometric properties for two samples of college students. The test-retest reliability coefficient was .75, and the alpha coefficient was .84 for the present sample. In addition, the criterion validity of the index was demonstrated by its ability to discriminate between patients with agoraphobia and other anxiety disorders as well as between anxiety-disorder patients and college students.

Catastrophic Cognition Questionnaire. The original 50-item Catastrophic Cognition Questionnaire (CCQ)^[25] was developed by Khawaja and Oei^[25]. Later a modified, shorter, 21-item version of the scale was developed by the same authors^[26]. This short form could be used to measure catastrophic cognitions in panic disorder patients and nonclinical populations. The scale was found to be internally consistent (ranging from .83 to .91), with a good test-retest reliability ($r=.63$) and concurrent validity. For the present sample, the alpha coefficient was moderately high ($r=.86$).

Procedure

The Malay version of all instruments was translated using back-translating procedures by four psychologists with at least a Master’s level of study and bilingual expertise. A professional language interpreter was recruited to proofread the translated questionnaires to ensure their overall suitability and to resolve issues of word ambiguity after translation. The back-translated versions were similar to the original versions and to each other. Minor differences in colloquial expressions in both languages were reconciled.

Signed informed consent was obtained from all participants in the study before they undertook the assessment. Ethical approval was sought from the Medical Research Ethics Committee of the Ministry of Health of Malaysia and all the hospitals and institutions that participated in this study.

Statistical analyses

Statistical Program Social Sciences (SPSS version 14.0; SPSS, Chicago, IL) was used to analyse data in this study. A number of statistical procedures were used such as descriptive statistics for data screening. In addition, Cronbach’s alpha coefficients (α) were computed to evaluate the reliability of the questionnaire, and correlations were calculated to examine the concurrent validity of the BAI, using the total sample. Factor analysis was also used to determine factor structure of the BAI. Prior to conducting the primary analysis, the data were examined for accuracy, missing values, outliers and multivariate assumptions. Details of the assumption testing of the data are presented in our previous study^[27].

RESULTS

A total of 1090 participants were recruited for this study. The sample consisted of 315 students (28.9%), 495 members of the general community (45.4%), 167 patients from a primary care unit (15.3%), and 113 patients diagnosed with depression from a psychiatric clinic (10.4%); Majority of participants were female (75.2%), and the participant’s ages ranged from 18 to 63 years, with a mean of 26 years. The educational backgrounds of the participants included high school certificate (47.6%), diploma/certificate level (17.1%) and university degree (32.5%); 1% of the total number of participants had only completed primary school and 1.8% did not specify their level of education.

Exploratory Factor Analysis

The present study investigated the factorial validity of the BAI. The 21 items of the BAI were submitted to a principal axis factoring with oblique rotations as suggested by Tabachnick and Fidell’s^[28]. A significant number of correlations with value greater than 0.33 were found indicative of favourability of the data set. Furthermore, the values of the Kaiser-Meyer-Olkin (0.95) and Bartlett’s Test of Sphericity ($p<.001$) suggested the suitability of the data for factor analysis. The number of factors to retain was conducted based on several criteria which were; 1) minimum eigenvalues of 1, 2) minimum factor loadings of 0.40, 3) minimal factorial complexity (multiple loading), and 4) meaningful

interpretation of factors.

Analysis yielded three factor structure of the BAI. Table 1 presents the item descriptions, factor loadings and communality estimates. The three factors accounted for 48.01% of the variance. Factor 1 which labelled as *subjective anxiety* accounted for 36.32% of the variance, factor 2 accounted for 6.59% of variance was labelled as *autonomic* and factor 3, which we labelled *neurophysiology* accounted for 5.10% of the variance.

Table 1. Rotated Component matrix of Exploratory Factor Analysis for the BAI-Malay

Item	Title	Factor 1	Factor 2	Factor 3	Communalities
1	Numbness			.69	.56
2	Hot			.74	.59
3	Legs			.52	.42
4	Relax	.54			.36
5	Fear	.67			.51
6	Dizzy	.52			.48
7	Racing	.69			.52
8	Unsteady	.67			.49
9	Terrified	.72			.62
10	Nervous	.69			.56
11	Chocking		.66		.48
12	Trembling		.42		.41
13	Shaky	.69			.56
14	Control	.55			.46
15	Breathing		.65		.49
16	Dying	.49			.31
17	Scared	.65			.53
18	Indigestion			.48	.44
19	Faint		.71		.51
20	Flushed		.53		.38
21	Sweat		.54		.43
Eigenvalues		36.32	6.59	5.10	
Total % of variance	48.01	23.97	13.40	10.64	
Cronbach α	0.91	0.89	.75	.66	

Reliability and Validity of the BAI-Malay

Internal consistency

The reliability of the BAI was calculated by using the Chronbach's alpha. Result showed in Table 1 that the BAI had an overall good alpha value of 0.91, specifically the reliability for Factor 1 (*subjective anxiety*) was .89, Factor 2 (*autonomic*) was .75 and Factor 3 (*neurophysiology*) was .66. This indicates that the 21-items BAI is a reliable instrument.

Concurrent Validity

The three concurrent factors of the BAI were measured using the Pearson correlation coefficient. Descriptions of the scales and their intercorrelations are presented in Table 2.

Existence of the concurrent validity was shown by a significantly positive relationship between the BAI-Malay

total scores with the FQ ($r=.32$), CCQ ($r=.23$), DASS ($r=.68$) and ASI ($r=.56$). Furthermore, the results also revealed that Factor 1 (*subjective anxiety*) had a significant relationship with FQ ($r=.33$), CCQ ($r=.22$), DASS-21 ($r=.67$) and ASI ($r=.52$). Factor 2 (*autonomic*) also showed significant relationship with the other four measures (FQ; $r=.23$, CCQ; $r=.16$, DASS; $r=.53$, ASI; $r=.48$). Additionally, the third factor (*neurophysiology*) was also found to have significant relationship with FQ ($r=.24$), CCQ ($r=.20$), DASS ($r=.49$) and ASI ($r=.45$). Due to large sample size, this indicates that the total scores of BAI-Malay shown acceptable concurrent validity.

Table 2. Intercorrelations for BAI-Malay scores and FQ, CCQ, DASS, ASI

Variables	FQ	CCQ	DASS	ASI
Total BAI-Malay	.32**	.23**	.68**	.56**
Factor 1	.33**	.22**	.67**	.52**
Factor 2	.23**	.16**	.53**	.48**
Factor 3	.24**	.20**	.49**	.45**

** $p < .01$ level

DISCUSSION

In general, the findings of the present study provide support for three factor structure of the BAI-Malay. The exploratory factor analysis (EFA) result revealed three correlated factors, one reflecting subjective *anxiety*, *autonomic* and the other is *neurophysiology*. The results did not support in most studies among Western population such as, two factor structures (somatic, subjective anxiety/panic) such in Beck and Hewit & Norton studies^[4, 11], four factors (Subjective, neurophysiological, panic, and autonomic) in Steer, Beck and Steer, and Osman *et al.* studies^[1, 4, 8, 15], and 5 factors in Borden, Peterson and Jackson study^[16].

One explanation on the discrepancy could be due to homogeneity (either just clinical or non-clinical samples) of the population in their studies. Meanwhile in the present study, four different samples inclusive of student, general population, medical and psychiatric patients were used which resulted in significant results. However, three items in *subjective anxiety* factor in our study are specifically consistent with Beck's study which consist of inability to relax, terrified and nervous. Although items fear and dying do not belong to *subjective anxiety* in the Beck's study, it was reported consistent in one study among Norwegian^[18]. Three items in *autonomic* factor in this study were also found consistent in Osman *et al.* studies which consist of items choking, trembling and difficulty breathing. Meanwhile, to support item loadings in third factor, *neurophysiological* were again reported consistently in Osman *et al.* study which include numbness, feelings hot, and wobbliness leg^[8, 12]. There is a slight lower percentage of total variance (48%) in this study compared to Beck's study (59%), but the result did not restrict the robustness of the overall findings.

Further finding in this study is the internal consistency (i.e reliability) that estimates of the BAI were satisfactory for most sub-scales (.66 to .89) but, considered good (.91) in total scores. Results revealed good internal consistent were consistently in agreement with other previous study both in Western^[29] or non-Western^[12] researches. This means that the BAI in Malay version is reliable to be used in future research in Malaysia.

In addition to establishing the factorial validity of the BAI-Malay, correlation scores examined between the BAI and other measures of anxiety showed significant relationships. Consistent with previous investigation, the BAI total and correlate significantly with all related anxiety measures^[12]. Specifically, the BAI-Malay showed highly significant relationship to DASS and ASI. This means that, the specific state symptoms of anxiety that measure in BAI is considered sensitive to symptoms of stress and anxiety assessed in DASS and ASI. Meanwhile, the lower significant relationship shown between BAI and VVQ, could best be explained by the background of the participants who are mostly in healthy range population. The psychiatric patients who undertook this study were mostly suffering from depression rather than anxiety diagnosis. Future research can further confirm and validate to see the sensitivity level of the BAI and CCQ among patients with anxiety disorders. Moreover, the FQ also showed low significant relationship to FQ which was in similar explanation with CCQ. This is because the measurement is specific on certain phobia such as social phobia, blood injury and agoraphobia which are not common among healthy populations but patients with anxiety disorders. This finding was also consistent in which the relationship between BAI and FQ is low as in a study where most of the participants are not having anxiety disorders such as in one study among Norwegian population^[18].

This study has specific problems that limit the generalizability of the findings. Our sample consists primarily of

Malay population. Besides that, other measures used for correlation have yet to be validated in the Malay sample. Despite these limitations, the present study is the first to extend investigation of the factorial validity of the BAI beyond the primary factors. In addition, our data argue strongly for the BAI used as an assessment of state anxiety. In general, the results support the use of BAI-Malay in both research and clinical work among Malay population in Malaysia.

This is one of the first studies to validate the BAI-Malay for use within a large and culturally different population and in which three subscales were subjected to factor analysis. This study provides clear evidence that the BAI-Malay is sufficiently reliable and a valid measure of state anxiety symptoms. In conclusion, despite the limitation, the findings show that the BDI-Malay has sound psychometric properties and is a reliable instrument for measuring levels of depression among Malays in Malaysia. Therefore, it can be used with confidence in the future.

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