COGNITIVE DISTORTION SCALE FOR BANGLADESH: DEVELOPMENT AND PROPERTIES

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Abstract

The purpose of the study was to develop a scale for assessing cognitive distortions in Bangladesh and establishing psychometric properties for Bangladeshi population. The scale was named as Bangladesh Cognitive Distortion Scale (BCDS). Items were constructed through three stages of intensive expert evaluation where 128 respondents participated and both item analysis and factor analysis were undertaken. Finalized BCDS with 39 items was administered to 478 respondents to calculate its psychometric properties. Concurrent validity of BCDS was found 0.828 by calculating correlation between the score of BCDS and clinician's subjective rating. Predictive validity considering anxiety and depression scale was found 0.756 and 0.841, respectively. Convergent validity (0.670) was confirmed through the correlation between the DAS and BCDS and divergent validity was established by the discriminate value (F=649.564, α<0.01) of clinical and non-clinical groups. Internal consistency reliability of BCDS (Cronbach Alpha-0.962 and test-retest- 0.890) was found very high. The cut-off point for measuring cognitive distortion by BCDS was found 56 with sensitivity 87% and specificity 88%. According to the percentile norm, total score 56 to 72, 73 to 91, 92 to 109, 110 and above represents the mild, moderate, severe, and profound levels of cognitive distortions respectively. BCDS not only will help both clinicians and researchers to assess cognitive distortions within a short time but also could be used as a valid and reliable outcome measure in cognitive behavior therapy.

Introduction

Cognitive-behavioral therapy is based on the theory that the way individual cognitively represents the world[1,2]. The cognitive theory claims that cognition derives from cognitive structures that develop out of pre-existing life experience and schema which guide how one perceives oneself, others, and the world around him/her[2]. When schema becomes dysfunctional, individuals engender distorted cognition, predisposing certain individuals to experience pathological emotional states. In this study, cognitive distortion is operationalized as subjectively right but not objectively, maintaining negative

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emotions and impairing behavioral functions. Ten types of cognitive distortions were used to assess cognitive distortion in this current study, as Beck and Burn classified, 1) All or nothing/Black & white thinking, 2) Disqualifying the positive, 3) Overgeneralization 4) Labeling mislabeling,5) Mental filtering, 6) Jumping to the conclusion 7) Magnification/ Catastrophizing and Minimization, 8) Emotional reasoning 9) Should statement and 10) Personalization. Negative interpretations of problems and situations lead individuals to believe that they cannot overcome their psychological difficulties which are prone to active one's cognitive distortions[2]. Modification of distorted cognition, and their related attitudes, beliefs, and information processing biases is a core mechanism leading to psycho-pathological symptom reduction[3]. Cognitive therapy helps patients to identify, test, and alter their distorted cognition. Despite the theoretical importance of cognitive distortions in the predisposing, maintaining factor as well as treatment planning of psychotherapy, little work has been directed towards developing a standardized sound psychometric tool to assess the content and quantity of cognitive distortions. Cognitive distortions are generally assessed by clinical interviews and self-monitoring but these are more subjective. Standardized psychometric measures of cognitive distortion would assist researchers and clinicians in examining the differences in pattern frequency, intensity, and content of cognitive distortions over the time.

Different measures have been developed to assess similar constructs related to cognitive distortions, such as-measures include The Interpersonal Cognitive Distortion Scale[4], Anxious Self-Statements Questionnaire[5], Automatic Thoughts Questionnaire[6], the Dysfunctional Attitudes Scale[7]; the measure of unconditional core belief about oneself – SAD[8]. Only four measures have been developed that attempt to directly assess cognitive distortions, there are -the Cognitive Error Questionnaire[9] – General Form, the Inventory of Cognitive Distortions[10], the Cognitive Distortions Scale[11] (CDS) and the Cognitive Distortions Questionnaire[12] (CD-Quest)

Cognitive development as well as cognitive distortions are very culturally motivated[13]. Research shows that cultures are particularly important to understand mental health problems and related factors[14-17]. Therefore, measures of these constructs should be culturally sensitive. CBT practitioners in Bangladesh, depend on clinical interviews for assessing cognitive distortion, which should be accompanied by psychometric tools. But there is no standardized culture-sensitive psychometric tool for assessing cognitive distortion. The dysfunctional Attitude Scale has been translated into Bangla[18] for clinical and research use, but it is not developed for Bangladesh culture. In addition to this, it is uncertain whether the foreign scale would exhibit the required sensitivity and specificity when applied to Bangladeshi individuals. Therefore, it is essential to develop a valid, reliable, and useful scale for assessing cognitive distortions in the Bangladeshi context. This paper explains the development and psychometric properties of the Bangladesh Cognitive Distortion Scale (BCDS).

Materials and Methods

The aim of this study was to develop a scale for assessing cognitive distortion and to establish the psychometric properties of this scale. In the first stage, items of the scale were constructed, in the 2nd stage, items were selected, and finally, in 3rd stage, psychometric properties of the scale were calculated.

After understanding the phenomena, the initial item pool of the BCDS was collected from different case reports of anxiety and depression (anxiety and depression are the core problems of all neurotic problems), text and research articles related to cognitive distortion and psychopathology, and also from expert opinions. Before finalizing the construction of the item, only those items were selected which meet 90% judge agreement and then researchers conducted field testing on 8 clinical respondents with anxiety and depression. Finally, Item analysis was used to predict the item consistency by which 69 items were finalized for the next step. In the 2nd stage of item selection, a total of 128 respondents (64 clinical and 64 non-clinical samples) participated, of whom 53.8% were male and the age ranged from 18-70 years. Item-total correlation of BCDS with all 69 items was found above 0.55, and the inter-item correlation was found 0.988 which indicate higher coherence among the items of BCDS. One-way analysis of variance (ANOVA) was used to compute a discriminate value (F value=378.293) at a 99% confidence interval and found that all 69 items had significant discriminate values. Hence, no item could be discarded and therefore, to promote clinical utility of BCDS, factor analysis was undertaken to reduce items. Factor loading was used for selecting more valid items, which is recommended to increase the clinical utility of any psychometric scale[19].

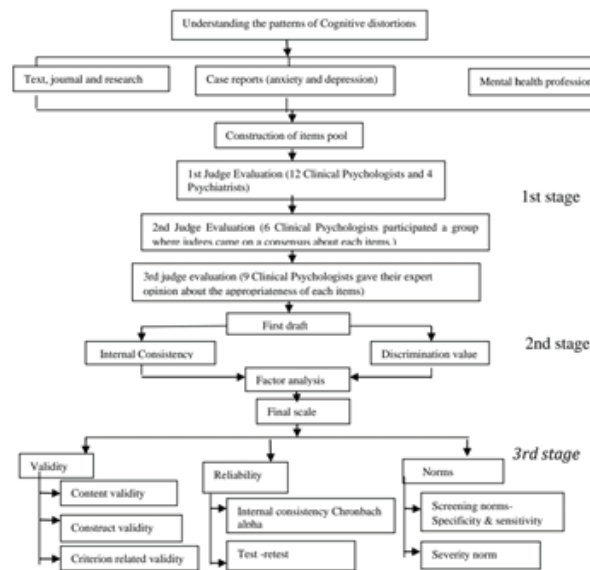The multi stage procedure implicated in the scale development is presented in figure 1

Fig. 1. Stages of the development of the scale for assessing cognitive distortions

According to the author of Guidelines for Reporting Scale Development and Validation, when the respondent size is less than 200, then the factor loading should be above 0.6. But in real-life study, data may not well meet this criterion, therefore, researchers, particularly in social sciences may use a thresholds ranged 0.4 to 0.6-factor loading[20]. In this study, the number of respondents for factor analysis was 128 and the threshold 0.55-factor loading was used for selecting more sensitive and specific items, greater than the threshold used in similar clinical study[19]. Finally, 39 out of 69 items were taken for the final scale. Internal consistency of the final scale having 39 items was higher, and the discriminate value was more significant than the scale with 69 items. The response options of BCDS were "Never comes to my mind", "hardly it comes to my mind", "comes to my mind occasionally", "comes to my mind frequently", and "always comes to my mind".

For developing psychometric properties in the 3rd stage, a total of 478 respondents (239 clinical having either anxiety or depression and 239 non-clinical) participated of whom 65% were male. Clinical respondents were selected from the National Institute of Mental Health (NIMH), the psychiatry department of Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, and a private clinic. In the context of Bangladesh Dhaka is the core city of health services where patients used to come from all over the country. Clinical sample in this study came from 61 districts of Bangladesh. Non-clinical sample were selected purposively by matching gender, age, religion, marital status and education level of clinical respondents.

Table 1. Demographic variables of clinical and non-clinical respondents

Variables	Frequency (%)	
Clinical respondents	Non-clinical respondents	
Gender		
Male	34 (53.1)	35(54.7)
Female	30 (46.9)	29 (45.3)
Age level		
18 to 30	47 (73.4)	49(76.6)
31 to 40	12(18.8)	7(10.9)
41 to 50	5(7.8)	8(12.5)
51 to 60	-	-

Criteria of Respondents: Adult (18 years or above) patients, diagnosed with anxiety and depression were included whereas having substance abuse disorder, personality disorder, or any form of psychotic conditions were excluded from clinical respondents. Only those were purposefully selected as non-clinical respondents who did not have any history of psychiatric diagnoses and scored at nonclinical level at GHQ-28.

Procedure for collecting data: During data collection, a written informed consent form was given to all respondents where the purpose of the study, confidentiality, freedom of choice, and all other ethical issues were described. After knowing everything about the study respondents had given their consent to participate in this study.

Assessment materials and procedure: The clinical respondents were assessed psychiatrists and CBT practitioners according to the criteria of DSM IV.

Demographic information: A questionnaire with demographic information was included with the BCDS and its first draft. Information such as gender, age, home district, birth district, marital status, religion was incorporated and was used to match the non-clinical with clinical participants.

The first draft of the Cognitive Distortion Scale: The first draft of the scale with 69 items of cognitive distortion of the scale was used for item selection for the final scale.

Bangladesh Cognitive Distortion Scale: The final draft of the current scale consisted of 39 items. Five-point Likert format was used as response options where the total score was calculated by summing up the score (0, 1, 2, 3, 4) of each item. For establishing the psychometric properties, the BCDS was used as an experimental tryout.

DAS **(**Dysfunctional Attitude Scale, form-A, Weissman and Beck in 1978)*:* DAS was translated into Bengali by Hossain and Begum[7] (2008) for use on Bangladeshi populations**.** The Spearman's rho correlation coefficient of this translated scale is significant (0.812 at $p > 0.01$).

Anxiety Scale[21]. This scale was developed by Deeba and Begum (2004) for assessing anxiety symptoms of Bangladeshi population. Split-half reliability of the scale was 0.916 (α =0.001) and the Cronbach's alpha reliability was 0.9468. The test-retest correlation (r =0.688) was also found to be significant (α =0.01)[21]. Construct validity of this scale was (F=60.275 at α=0.01) and item total correlation (which ranged from r=0.399 to r =0.748, $\alpha < 0.01$).

Depression Scale[22]: This depression scale was used to measure the presence of depressive symptoms of the sample for establishing the predictive validity of the current scale Scale[22] The split-half reliability was 0.7608 and test-retest reliability was 0.599 (significant at $\alpha < 0.01$). The scale discriminated between depressed and non-depressed samples (F=85.86, significant at $\alpha < 0.01$) which were conducted on a group of 104 samples. (52 depressed and 52 non depressed samples)

Subjective rating of Clinical Psychologist about the respondents*:* Subjective rating of clinical psychologists (about the severity level of cognitive distortion of their client with anxiety and depression) was used as an instrument for ensuring the concurrent validity of the BCDS.

The General Health Questionnaire 28 (GHQ-28) Test-retest reliability of the GHQ-28[23] is 0.51 to 0.90 and the split-half reliability is 0.95. GHQ-28 was translated into Bengali by Banoo (2001)[24] and the test-retest reliability of this translated scale is 0.682.

After collection of data in every stage and insertion in SPSS 19 software, they were analyzed by descriptive statistics, compare means, correlate, regression, scale and ROC curve as purpose.

Results and Discussion

Findings of Item analysis & Factor analysis: Mean score with 69 items of BCDS for the clinical respondent (N=64) was 163.26 and for non-clinical (N=64) was 26.94. Item analysis of BCDS with 69 items indicates that 97% items were highly internally corelated (>.6). Moreover, Kaiser Meyer Olkin measure value of factor analysis was .806 (higher than expected value .6), both of which satisfied the assumption of factor analysis. Considering factor loading .55 and above finally, 39 out of 69 items were selected by factor analysis. The item-total correlation of BCDS with 39 items was 0.979 which was greater than that of 69 items (0.962). BCDS with 39 items can clearly distinguish clinical population from non-clinical population (F value=378.293) at 99% confidence interval.

Psychometric Properties: For establishing the psychometric properties of this BCDS 478 respondents (239 clinical and 239 non-clinical) participated. The mean of cognitive distortion of clinical and non-clinical samples was respectively 88.10; SD 28.36 and 30.55; SD 20.34. In this stage, the new scale was verified with different types of standard measurements and justified its reliability with different procedures. Finally, norms of the BCDS were established, for assessing the cognitive distortion of the Bangladeshi population.

Content Validity: Nunnally and Bernstein argued that the content validity of a test is confirmed during the item construction[25]. If more than half the panelists indicate that an item is essential, that item has at least some content validity[26]. Items of the BCDS have been selected after 3rd judge evaluation, only those items were finalized for final draft, in which, 90% of judges came into an agreement based on the appropriateness for assessing cognitive distortions, which is strong evidence for the content validity.

Concurrent validity: BCDS was administered to 26 clients with anxiety and depression. Concurrently CBT experts evaluated the severity level of cognitive distortion of those clients on 5 points subjective rating (0 to 4). Then the correlation between the scores of BCDS and the subjective rating score was calculated and the correlation was significant (r=0.828 at p<0.01), which ensured the concurrent validity of the BCDS.

Predictive validity: Cognitive distortion is one of the independent variables for psycho-pathology. So, the BCDS and anxiety scale[21] were administered among 47 clients of anxiety-based disorder between two weeks, and the correlation was found significant (r=0.756 at α<0.01). In the same way, the current scale and depression scale[22] were administered to 46 clients with depression, and the correlation between those scales was significant (r=0.841, α<0.01). This means that when the score of cognitive distortion of a person is high, then it can be predicted, that person can be suffered from anxiety or depression.

Convergent validity: Dysfunctional attitude is a similar type of construct of cognitive distortion. So, for ensuring the convergent validity of this scale, the new scale and DAS

Dysfunctional Attitude Scale, form-A,[7] was administered to 120 clients with anxiety and depression. The correlation (r=0.670, p<0.01) between the score of the two scales was calculated using the Pearson-moment product coefficient which provides an evidence of convergent validity.

Divergent validity: There is no standardized psychometric scale in Bangladesh that can assess the opposite construct of cognitive distortion, the cognition of the non-clinical population was selected as the opposite construct of the cognition of the clinical population. So, the divergent validity of the BCDS was assessed through the ability of the scale to discriminate the cognitive distortion of clinical (239 clinical respondents) and non-clinical (239 non-clinical respondents) respondents. This calculation was done by using ANOVA (F value) and the discriminate value was, F=649.564 which was significant at $\alpha<0.01$.
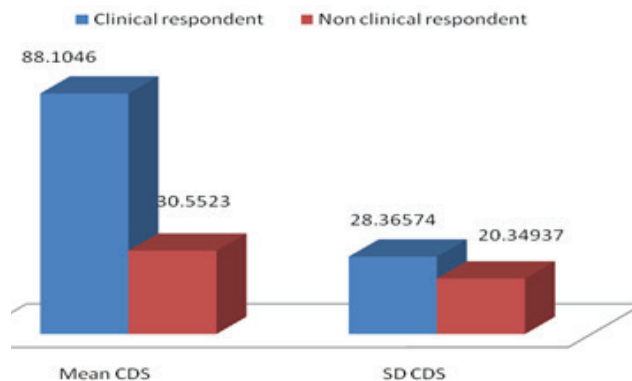

Fig. 2. The mean and standard deviations of cognitive distortion for current sample using BCDS

Test-retest reliability: BCDS was administered to the 62 non-clinical respondents, two times with an interval of two to three weeks, and the correlation (r=0.890, p<0.01) was significant. A scale needs to have a minimal test-retest reliability of 0.70[27,28].

Internal consistency: Internal consistency was assessed by the calculation of Cronbach alpha and was found 0.962 which indicates an excellent level of internal consistency[29] and it means that all items of BCDS are equivalent and measure cognitive distortion excellently.

Screening Norm: Among 606 respondents, the norms were developed on 478 respondents (239 clinical and 239 non-clinical individuals). For the BCDS, it is found that the optimal cut-off score was 56, which achieved 87% sensitivity and 88% specificity for screening cognitive distortions.
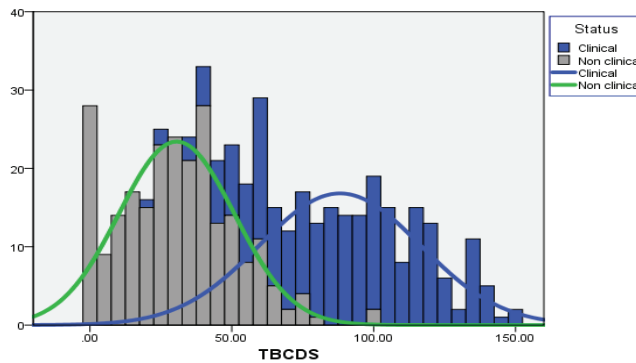
Fig. 3. Normal curve of the scale scores of clinical and non-clinical respondents used in the current study

Diagnostic performance is the ability of a scale is evaluated using 'Receiver Operating Characteristic' (ROC) curve analysis[30]. The area of the ROC curve of the BCDS was 0.949 (significant at $\alpha < 0.01$) which represents a scale of cognitive distortion with excellent performance.
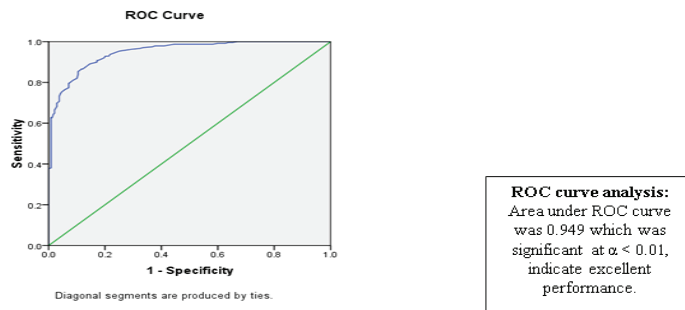

Fig. 4. ROC curve of the current scale

Severity Norm: For developing the severity norm of the cognitive distortion scale percentile norm was used. 478 respondents (239 clinical and 239 non-clinical) contributed to establishing this norm. The raw score of the respondents was converted into three percentile points (25th, 50th, 75th) which divided the scores into four percentiles (0 to 25th, 26 to 50th, 51 to 75th, and 76 to 100th). Finally, the norm of the scale for assessing cognitive distortion is mild, moderate, severe, and profound when the range of the raw score is 56 to 72, 73 to 91, 92 to 109, and 110 to above, respectively.

The aim of this study was twofold,1st to develop a scale for assessing cognitive distortion of the neurotic clients in Bangladeshi culture; 2nd to ensure psychometric properties of the scale. For the developing purpose of this standardized scale, a total of 606 respondents

participated in different stages. A sequential system approach for scale development was followed in the construction of BCDS.1st stage: item construction: 69 items were finalized after multi-stages of expert opinion with 90% agreement, 2nd stage: item selection: 39 items were selected through item analysis and factor analysis and 3rd stage: establishment of psychometric properties: psychometric properties were ensured by establishing reliability, validity, and norm of the scale.

Validity: 90% judge's agreement in item selection ensured *content validity* as this validity is a concept of expert's agreement[31].

The concurrent validity of the current scale was assessed concurrently administration of this BCDS on anxiety and depression clients and taken the subjective rating (0 to 4) of the CBT experts about the severity level of those clients. The correlation was found to be significant, (r=0.828, α<0.01), it is often said that the correlation between two measurements should be high but not too high because a too high correlation poses questions about the necessity of the new measurement[32,33].

Predictive validity measured by the correlation of the scale of cognitive distortion with anxiety and depression scales. The BCDS and anxiety scale[21]was administered among 47 clients with anxiety-based disorder within two weeks. Similarly, in the same time frame, BCDS and depression scale[22] were administered to 46 clients with depression. The correlation between the score of the BCDS and anxiety scale (r= 0.756); BCDS and depression scale (r= 0.841) which indicates a high correlation, so it can be predicted that if an individual gets a high score on the scale of cognitive distortion, then this individual might be suffering from anxiety and depression.

Verification of the *construct validity* of the current scale was accumulated from convergent and divergent validity[32]. For assessing *convergent validity*, the BCDS and DAS (Dysfunctional Attitude Scale, form-A, Weissman and Beck, 1978) were administered to 120 clients with anxiety and depressive disorder, and the scores of the two scales were correlated. The correlation was found r=0.670 which was significant at α<0.01. The divergent validity of the current scale was calculated on the score of 239 clinical and 239 non-clinical samples and a significant difference (F=649.564 at α<0.01) was found which indicates that the BCDS can discriminate cognitive distortions between clinical and non-clinical populations.

The reliability of the BCDS was calculated through internal consistency reliability and test-retest reliability. *Internal consistency* was assessed on the score of 478 clinical and non-clinical samples and Cronbach Alpha for the total scale was found 0.962 which indicates excellent internal consistency. DeVellis (1991) suggested that above 0.90 is excellent[29].

The current scale was administered twice (2 to 3 weeks duration) to 62 non-clinical individuals for assessing the *test-retest reliability* of the scale and the correlation coefficient between the score of the two administrations was found significant (r=0.890, at α<0.01).

For developing standard norms for the BCDS, screening and severity norms were established. The norm of the scale was developed based on the score of the 478 samples. The

cutoff point for the current scale is 56 because this cutoff point confirmed 87% sensitivity and 88% specificity which was more optimal than another provable cutoff point. The diagnostic performance of the current scale was assessed through the ROC curve (Figure 3.3). The area of the ROC curve of the scale was 0.949 which was significant at $p < 0.01$, indicating excellent performance.

The severity norm of the scale was categorized on four levels namely, mild, moderate, severe, and profound and the corresponding scores of these different severity levels are 56 to 72,73 to 91,92 to 109, and above 110. Using percentile norm, it's very easy to compute and understand for an individual even who has no technical knowledge or training, BCDS, is a self-administered, moderate-length of scale with 39 items, and the age range of applicability of this scale is 18 to 90 years. The format of the BCDS is paper pencil, it takes 10 to 15 minutes to administer.

DAS was developed by Weissman and Beck (1978) for clients with depression, but now this scale is used in research and clinical practices worldwide to assess the dysfunctional assumption of all other neurotic patients. In the same way, all although the BCDS was developed on clients with anxiety and depression, this scale might be assessed cognitive distortion of all other neurotic disorders.. For many years Clinical psychologists and trainee Clinical psychologists in our country felt necessary for having a psychometric scale that can assess cognitive distortion appropriately in a short time. BCDS will fulfil the demand to assess cognitive distortion not only for the Bangladeshi population but also all over the people who belong to Bengali values because it was developed based on the Bengali culture context.

Limitations are acknowledged in this study, such as the phenomenology of cognitive distortion itself is challenging to transfer into objective languages. Items for the subscale could be calculated to increase the performance, clinical utility and psychometric strength of this scale. Different psychiatric conditions usually been initiated, mediated and maintained by the most common psychiatric problems- anxiety and depression- and therefore, BCDS was validated on patients having anxiety and depression. Further analysis should be undertaken, including other psychiatric patients, before generalizing the current findings.

This was a self-funded study in which 606 respondents (clinical and non-clinical) participated. Future researchers are requested to undertake reliability analysis of BCDS using their own datasets and inform the scale developers to calculate its robustness. Moreover, the factor analysis used in this study demands a larger sample size, which was not possible to ensure in the current context. Future researchers should replicate this aspects to promote further generalization of BCDS. Additionally, necessary factor analysis procedures, such as extraction and rotation methods, criteria for factor retention, and goodness-of fit statistics, were not carried out, which are essential for evaluating the robustness of the factor structure. Future studies should provide comprehensive factor analysis reporting to enhance the replicability of the findings and to clarify the factor structure of the scale, whether it is single or multi-factorial.

We expect that the BCDS will help both clinicians and researchers assess and determine the severity of cognitive distortions within a short time. Moreover, BCDS might be used as a valid and reliable outcome measure in cognitive behavior therapy not just in Bangladesh but in Bangla speaking minority ethnic groups in other countries. However, it is recommended that clinicians and researchers use this scale with the understanding that the current findings are generalizable within the cultural and clinical context of Bangladeshi population, particularly among Bangla-speaking individuals with anxiety and depression as the independent or cooccurring disorder. Caution should be exercised when applying the scale to other populations or settings until further validation studies are conducted. Future research with randomized sampling and comprehensive factor analysis is needed for to enhance the generalizability of BCDS.

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