EVALUATING PSYCHOMETRIC PROPERTIES OF BDI II: A CASE STUDY

Dr. Irani Saikia

Assistant Professor, Dept. of Statistics, PDUAM, Behali, Assam

Email : irani.saikia@gmail.com

Abstract

Beck Depression Inventory (BDI) II is a tool/ instrument for assessing mother's depression. The psychometric properties (reliability & validity) of this tool are evaluated for a sample of 2153 caregivers having children up to 3 years in the context of Assam, India. The Cronbach alpha (α) coefficient of internal consistency and correlation matrix have been used for this purpose. The findings showed that the Assamese version of the test instrument is both reliable and valid.

Key words: Reliability, Validity, Cronbach alpha, Correlation matrix

1. INTRODUCTION

Mothers are the main caregivers of any family. Despite being the main caregiver, they are the most vulnerable one also. The state of mind of the mothers during the pregnancy period and even after the delivery of the child has the most crucial impact on child's cognitive development. In a latest study [Gupta S. et al. 2021] conducted during September- November 2019 in India it is observed that prevalence of developmental delay is 6.6% (95% CI 3.6-9.8) among children of slums aged below two years. Previous literature review also showed that mother's depression is one of the risk factors of child developmental delay. The Beck Depression Inventory (BDI) II is one of the most widely used depression inventories of its kind. The instrument having 4 point 21-items Likert scale [Rhee et al, 1995] with four multiple-choice responses, is useful for measuring

mother's depression status. Each item measures a specific symptom of depression. The assessed symptoms of depression include depressed mood, feeling hopeless, feelings of failure, loss of pleasure, feeling guilty, punishment, self-dislike, blaming self, suicidal thoughts, crying, agitation, loss of interest in activities, indecisiveness, feeling worthless, fatigue, sleeping difficulties, feeling irritable, appetite difficulties, decreased concentration, loss of energy and loss of sexual desire.

2. SCORING OF THE INSTRUMENT

Each of the multiple-choice responses is given a score from zero to three. This score assesses the severity of the depressive symptom. After completing the questionnaire, the score for each of the twenty-one questions by counting the number to the right of each question marked are added up. The highest possible total for the whole test is sixty-three and the lowest possible score for the test is zero. The score so obtained depicts the state of depression according to the Table.2.1 below:

Table. 2.1: BDI II Scores with Levels of Depression

Total Score	Levels of Depression
1-10	These ups and downs are considered as normal.
11-16	Mild mood disturbance
17-20	Borderline clinical depression
21-30	Moderate depression
31-40	Severe depression
Over 40	Extreme depression

The tools used in this study, viz. Beck Depression Inventory (BDI) II was developed in the western countries. The sources of development of these test instruments are culturally and geographically different from the state of Assam and in our country. Thus, before using the

instrument, testing the reliability and validity of the same for the specified area is mandatory. Keeping this point in view, the reliability and validity test of the instrument have been done for a sample (pilot survey) of 100 children up to 3 years in the context of Assam, India.

The psychometric (reliability and validity) properties of the instrument showed acceptable results for reliability and for validity. However, the instrument is re-verified with a sample of 2153 observations after collection of complete information to decide whether modifications in the above tool is required in case the tool shows different result for larger sample size. Different reliability and validity measures utilized to evaluate the psychometric properties of the tool for both (pilot and main) the surveys have been discussed in the paper.

3. PRINCIPLES BEHIND RELIABILITY AND VALIDITY TEST & THEIR MEASURES APPLIED ON THE INSTRUMENT AND METHODOLOGIES

Reliability and validity are the most important and fundamental characteristics of any measurement procedure. These are the two important characteristics of behavioral measure and are referred to as psychometric properties.

Reliabilty refers to the consistency with which any measuring instrument estimates different attributes i.e. the consistency of the results we obtain from an assessment. There are several methods of estimation of reliability of an instrument including test-retest reliability, parallel form's reliability, internal consistency reliability etc. Test-retest reliability is the degree to which scores are consistent over time. Parallel form's reliability is the correlation between two forms of a test that measure the same concept. According to Hitchhiker's guide to reliability [Charles, 2005] through internal consistency reliability, the results on different tasks or sections of an assessmnet are compared to see how well they relate. For this, although several methods are available but the most common among those is Cronbach's alpha coefficient [Cronbach, 1951]

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum s_i^2}{s_t^2}\right)$$

Here, k is the number of items $s_i{}^2$ is variance of ith item and $s_t{}^2$ is the variance of the total score.

Cronbach alpha ranges from 0 to 1, with values close to 1 indicating high consistency. According to Bjordal et al. [1992], if the Cronbach's alpha co-efficient is more than 0.7, then the scale is reliable in that context. Moreover, the social cut off of this co-efficient is also considered as equal or higher than 0.7. The higher the score, the more reliable the generated scale is. Nunnally [1978] has indicated 0.7 to be an acceptable reliability coefficient but lower thresholds are sometimes used in the literature. If the total alpha value is more than 0.6 then the instrument is considered to represent a measure of good internal consistency [Downing SM, 2004]. In this study, the instrument has gone through Cronbach alpha coefficient to test the reliability of it.

Validity refers to the degree to which a test measures what it claims, or purports, to be measuring [Brown, 1996]. The content validity, criterion validity and the construct validity are the three types of validity available. Through content validity, the content of a test represents the conceptual domain it is designed to cover. Anastasi [1968] defined content validity as "it involves essentially the systematic examination of the test content to determine whether it covers a representative sample of the behavior domain to be measured". Criterion validity of a test involves the relationship or correlation between the test scores and scores on some measure representing an identified criterion. The construct validity test is to examine in terms of a construct, Cronbach and Meehl [1955] defined construct validity as the degree to which an instrument measures the construct it is intended to measure.

One of the ways to measure the content validity of a tool is Phi coefficient [Yule, G.U., 1912]. It is the product- moment coefficient of correlation and is a variation of Pearson's definition of *r* when the two states of each variable are given values of 0 and 1 respectively. It was designed for the comparison of truly dichotomous distributions, i.e., distributions that have only two points on their scale which indicate some unmeasurable attribute. Attributes such as living or dead, black, or white, accept or reject, and success or failure etc. [Encyclopedia of

Statistical Sciences, Copyright © 2006 John Wiley & Sons, Inc.] The phi coefficient is given as,

$$\emptyset = (ad - bc)/\sqrt{(a+b)(c+d)(a+c)(b+d)}$$

Where, , *b, c*, and *d* are the cells of a 2x2 table.

The Phi coefficient which is also sometimes known as the Yule *φ* [Yule, 1912], have range from -1 to +1 [Davenport & El-Sanhury, 1991].

The construct validity of an instrument can be tested through inter-item correlation matrix, correlation matrix and multi-trait multi-method correlation matrix. Earlier Campbell and Fiske [1959] have demonstrated that for establishing construct validity, the convergent and divergent validity is necessary. It is a related concept. The multi trait multi method correlation matrix can examine the convergent and discriminant validity, i.e. construct validity. It utilizes the item internal consistency and item discriminant validity concept. Item internal consistency is satisfactory if the Pearson's coefficient of correlation of all items with its own skill is above 0.40. However, there are instances in which it is best to accept item-scale correlation coefficients lower than 0.40 [Ware and Gandek, 1998]. The discriminant validity is observed if domains of the instrument correlate higher (significantly) with its own domain than competing domains.

The instrument viz. BDI II has gone through the construct validity measures utilizing inter-item correlation matrix, the correlation matrix and multi-trait multi-method correlation matrix respectively.

4. DATA ANALYSIS

4.1. Results Obtained from Pilot Survey:

I. Reliability of the Tool:

The reliability of the instruments, BDI II in the context of Assam, more specifically for Dibrugarh district of Assam are computed through internal consistency reliability, which utilizes the Cronbach's alpha (α) coefficient and are presented in Table-4.1(a) below:

Table- 4.1(a): Internal consistency reliability of BDI II

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
0.776	0.817	21

From the reliability value it is observed that the instrument BDI II is reliable in the context of the study area.

I. Validity of the Tool:

The validity of BDI II in the context of Assam, more specifically for Dibrugarh district of Assam are computed through construct validity and is presented in Table-4.1(b) below:

Table-4.1(b): Correlation Matrix for BDI II:

Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	.38	.43	.43	.44	.44	.40	.44	.45	.44	.49	.43	.44	.45	.44	.43	.46	.45	.45	.44	.44	.44
2	.48	.42	.48	.49	.48	.49	.48	.49	.50	.51	.49	.48	.47	.48	.50	.51	.50	.50	.50	.49	.49
3	.30	.30	.24	.28	.31	.31	.33	.33	.31	.33	.32	.32	.36	.32	.34	.37	.31	.35	.29	.29	.31
4	.38	.38	.36	.29	.38	.40	.41	.39	.39	.39	.41	.38	.38	.40	.38	.38	.38	.37	.37	.39	.37
5	.49	.48	.49	.48	.39	.48	.50	.48	.50	.50	.48	.48	.49	.48	.50	.51	.49	.50	.49	.50	.50
6	.42	.45	.45	.46	.44	.36	.44	.43	.45	.46	.45	.46	.46	.43	.45	.48	.46	.44	.47	.48	.47
7	.44	.44	.46	.47	.46	.44	.37	.43	.44	.44	.44	.43	.47	.45	.45	.45	.45	.47	.45	.45	.44
8	.43	.43	.44	.44	.41	.40	.41	.36	.43	.44	.42	.42	.41	.41	.44	.45	.43	.43	.44	.45	.47
9	.49	.51	.49	.50	.52	.50	.49	.50	.43	.46	.48	.50	.50	.50	.49	.47	.49	.49	.50	.50	.52
10	.50	.50	.49	.49	.50	.49	.48	.49	.47	.35	.49	.50	.49	.49	.49	.44	.49	.50	.48	.50	.51
11	.54	.54	.54	.57	.52	.54	.53	.53	.52	.53	.47	.52	.53	.51	.53	.56	.52	.55	.54	.52	.53
12	.38	.36	.38	.38	.36	.39	.36	.36	.38	.40	.36	.30	.37	.38	.37	.40	.38	.37	.39	.37	.36
13	.36	.33	.35	.35	.35	.36	.35	.33	.36	.35	.34	.34	.26	.34	.36	.39	.39	.34	.35	.35	.35
14	.63	.63	.64	.64	.63	.62	.65	.62	.64	.63	.62	.64	.63	.54	.63	.66	.64	.64	.65	.64	.63
15	.41	.42	.42	.40	.43	.41	.41	.43	.41	.42	.41	.41	.43	.41	.35	.43	.41	.41	.42	.41	.38
16	.39	.39	.39	.39	.40	.40	.39	.39	.38	.36	.40	.39	.40	.40	.39	*.12*	.40	.39	.38	.39	.41

Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
17	.48	.49	.47	.47	.48	.48	.48	.47	.47	.48	.47	.48	.47	.48	.47	.51	.41	.47	.46	.45	.46
18	.50	.50	.50	.49	.50	.48	.50	.49	.49	.50	.50	.49	.49	.50	.49	.50	.49	.35	.50	.50	.49
19	.25	.26	.22	.24	.25	.27	.25	.26	.25	.24	.26	.26	.25	.27	.25	.24	.23	.27	*.18*	.22	.25
20	.54	.54	.53	.55	.55	.57	.54	.56	.54	.56	.54	.54	.54	.55	.54	.55	.52	.55	.52	.47	.52
21	.35	.35	.35	.34	.36	.36	.34	.37	.37	.38	.35	.35	.35	.35	.34	.39	.35	.35	.35	.34	.22

4.2. Results obtained from Main Survey:

I. Reliability of the Tool:

The reliability of BDI II in the context of Assam, more specifically for Dibrugarh district of Assam is computed again, though they showed reliable result in the earlier visit after collection of complete data. This is done to re-verify it with larger sample through internal consistency reliability, utilizing the same Cronbach's alpha (α) coefficient used in the earlier sample and are presented in Table-4.2(a),

Table-4.2(a): Internal Consistency Reliability of BDI II

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.842	0.854	21

From the reliability table, it is observed that the instrument is showing reliable result with the second sample (main) also. Thus, there is no doubt in its use in Dibrugarh district and Assam as a whole.

II. Validity of the Tool:

The validity of BDI II in the context of Assam, more specifically for Dibrugarh district of Assam is computed again with the complete data set and the result is presented in Table-4.2(b) below:

Table-4.2(b): Correlation Matrix for BDI II

Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	.38	.43	.43	.44	.44	.40	.44	.45	.44	.49	.43	.44	.45	.44	.43	.46	.45	.45	.44	.44	.44
2	.48	.42	.48	.49	.48	.49	.48	.49	.50	.51	.49	.48	.47	.48	.50	.51	.50	.50	.50	.49	.49
3	.30	.30	.24	.28	.31	.31	.33	.33	.31	.33	.32	.32	.36	.32	.34	.37	.31	.35	.29	.29	.31
4	.38	.38	.36	.29	.38	.40	.41	.39	.39	.39	.41	.38	.38	.40	.38	.38	.38	.37	.37	.39	.37
5	.49	.48	.49	.48	.39	.48	.50	.48	.50	.50	.48	.48	.49	.48	.50	.51	.49	.50	.49	.50	.50
6	.42	.45	.45	.46	.44	.36	.44	.43	.45	.46	.45	.46	.46	.43	.45	.48	.46	.44	.47	.48	.47
7	.44	.44	.46	.47	.46	.44	.37	.43	.44	.44	.44	.43	.47	.45	.45	.45	.45	.47	.45	.45	.44
8	.43	.43	.44	.44	.41	.40	.41	.36	.43	.44	.42	.42	.41	.41	.44	.45	.43	.43	.44	.45	.47
9	.49	.51	.49	.50	.52	.50	.49	.50	.43	.46	.48	.50	.50	.50	.49	.47	.49	.49	.50	.50	.52
10	.50	.50	.49	.49	.50	.49	.48	.49	.47	.35	.49	.50	.49	.49	.49	.44	.49	.50	.48	.50	.51
11	.54	.54	.54	.57	.52	.54	.53	.53	.52	.53	.47	.52	.53	.51	.53	.56	.52	.55	.54	.52	.53
12	.38	.36	.38	.38	.36	.39	.36	.36	.38	.40	.36	.30	.37	.38	.37	.40	.38	.37	.39	.37	.36
13	.36	.33	.35	.35	.35	.36	.35	.33	.36	.35	.34	.34	.26	.34	.36	.39	.39	.34	.35	.35	.35
14	.63	.63	.64	.64	.63	.62	.65	.62	.64	.63	.62	.64	.63	.54	.63	.66	.64	.64	.65	.64	.63
15	.41	.42	.42	.40	.43	.41	.41	.43	.41	.42	.41	.41	.43	.41	.35	.43	.41	.41	.42	.41	.38
16	.39	.39	.39	.39	.40	.40	.39	.39	.38	.36	.40	.39	.40	.40	.39	*.12*	.40	.39	.38	.39	.41

Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
17	.48	.49	.47	.47	.48	.48	.48	.47	.47	.48	.47	.48	.47	.48	.47	.51	.41	.47	.46	.45	.46
18	.50	.50	.50	.49	.50	.48	.50	.49	.49	.50	.50	.49	.49	.50	.49	.50	.49	.35	.50	.50	.49
19	.25	.26	.22	.24	.25	.27	.25	.26	.25	.24	.26	.26	.25	.27	.25	.24	.23	.27	*.18*	.22	.25
20	.54	.54	.53	.55	.55	.57	.54	.56	.54	.56	.54	.54	.54	.55	.54	.55	.52	.55	.52	.47	.52
21	.35	.35	.35	.34	.36	.36	.34	.37	.37	.38	.35	.35	.35	.35	.34	.39	.35	.35	.35	.34	.22

From the revisit it is observed that the tool is showing valid result with larger sample size as well.

5. DISCUSSION:

Different studies around the globe have utilized this instrument to assess the state of depression. It has been translated to more than 11 languages, including Spanish, Chinese, Dutch, Finnish, French (Canadian), German, Korean, Polish, Swedish, Arabic and Turkish. According to the author, the internal consistency reliability for BDI_II is ranging from 0.84 to 0.93, utilizing the Cronbach alpha coefficient while validated with college students [Beck et. al., 1996; Osman et. al., 1997; Steer & Clark, 1997; Dozois et. al., 1998; Smith & Erford, 1998; Whisman et. al., 2000; Musawi, 2001; Schulenberg & Yutrzenka, 2001], adult psychiatric outpatients and adolescent psychiatric outpatients [Beck et. al., 1996; Steer et al 1998; Steer et. al., 1999; Steer et. al., 2000; Buckley et. al., 2001; Coelho et. al., 2002; Kumar et. al., 2002; Sprinkle et. al., 2002; Osman et. al., 2004; Grothe et. al., 2005]. Various other research studies have examined the psychometric properties of the BDI-II using a variety of samples in different context and all showed strong support for its utility in those contexts. It demonstrated high internal consistency (α = 0.90 to 0.94), with item-total correlations ranging from 0.54 to 0.74 [Arnau et. al., 2001; Raes 2010]. A high test-retest correlation (r = .93) was found in a study with outpatients between their first and second week of therapy sessions [Beck et. al., 1996]. In other study, internal consistency reliability coefficients were ranging from 0.56 to 0.87 and also the intra-class correlation coefficients were 0.56 to 0.87, while validating the BDI in Malaysian urological population [Quek et. al., 2001]; Leigh and Tolbert [2001] reported a non-clinical sample of 53 hearing impaired university students that produced a test-re-test correlation of 0.74 for the instrument; a study conducted in Japan by Kojima et al [2002] found alpha coefficient as 0.87; another study [Osman, et al, 2004] found that the reliability ranges from 0.72 to 0.91 for that instrument. A study made by Byrne et al [2004], in Hong Kong community showed internal consistency reliability as 0.91. Another study conducted by Karen et. al., [2005] evaluated the

psychometric properties of BDI-II in a sample of low-income African American medical outpatients and found a high internal consistency reliability ($\alpha = 0.90$) and good item total correlation. In studies [Wiebe et. al., 2005; Wang et. al., 2005; Kapci et. al., 2008; Gintinga et. al., 2013] showed high reliability coefficient for the instrument ranging from 0.82 to 0.90 in its different versions like English, Spanish, Portuguese (in Brazil), Turkish, Indonesian etc. Thus, literature showed internal consistency reliability for the instrument ranging from 0.56 to 0.94 in different parts of the world in various contexts.

In this study also the Cronbach alpha coefficient is computed for BDI-II. From Table-4.1(a), the internal consistency reliability of BDI-II is found to be 0.776 for the first sample and again from Table-4.2(a) for the main sample also α value is found to be 0.842. These are the indication of high internal consistency reliability for the instrument in the context of the study area.

So far as validity is concerned, the initial version was compared to clinical determination of the intensity of depression and was correlated with Hamilton Rating Scale for Depression. Steer et. al., [1998] in their study on adolescent psychometric outpatients found moderate to high convergent validity for BDI-II. Construct validity testing performed in comparison to the SCL-90-R showed that the BDI-II was more strongly correlated with the depression subscale ($r = .89$) than the corresponding anxiety subscale ($r = .71$) [Steer et. al., 1997]. While applying to a sample of low-income African American medical outpatients the criterion related validity for the instrument was found to be satisfactory [Karen et. al., 2005]. The factor validity using the confirmatory factor analysis found best fit of the instrument in a study conducted by Wiebe et. al., [2005]. The instrument satisfies the content and criterion related validity in the study on Portugese speaking Chinese community in Brazil [Wang et. al., 2005]. Another study found Turkish version of BDI-II showed satisfying convergent validity for the instrument in Turkish population [Kapci et. al., 2008]. Gintinga et. al., [2013] in their study investigated the construct validity and discriminative power of Indonesian version of BDI-II and found satisfying showing significantly positive correlation. Thus, for

validity different studies utilizes different methods and types of validity measures for the instrument and the results are in positive direction for BDI-II.

The Construct validity for BDI-II is investigated for the first time in the study area with the fist sample through correlation matrix and is presented in Table-4.1(b). It is observed that all the coefficients of the matrix are significant except the two questions Q.16 and Q.19 of the instrument. Thus, the translated version of the instrument BDI-II can be considered valid in the context of the study area with two exceptional cases. Considering the exceptions and hopping that these exceptions are due to translation error or may be due to the size of the sample and may not occur in case of a larger sample, the correlation matrix for BDI II is constructed once again with the main sample and is presented in Table-4.2(b). From the matrix it is observed that, the exceptional cases of the earlier study have been vanished and all the coefficients are positively significant, thus the instrument can be used in the study area without any modification as it has the construct validity.

Thus, from the above results and discussions on psychometric properties (reliability and validity) of the test instrument for assessing mother's depression, the Assamese version is in confirmatory with the literature and thus can be said that the instrument is both reliable and valid in the context of Assam, more specifically Dibrugarh district of Assam.

References:

[1] Anastasi, A. [1968]: Psychological Testing. New York: Macmillan.

[2] Arnau, R.C., Meagher, M.W., Norris, M.P. & Bramson, R. [2001]: Psychometric evaluation of the Beck Depression Inventory-II with primary care medical patients. *Health Psychology*, *20*, 112-119.

[3] Beck, A.T., Steer, R.A. & Brown, G.K. [1996]: *BDI-II Manual*. San Antonio, TX: The Psychological Corporation.

[4] Bjordal K. & S. Kaasa [1992]: "Psychometric Validation of the Eortc Core Quality of Life Questionnaire, 30-item Version and a Diagnosis-Specific Module for Head and Neck Cancer Patients". *Acra Oncologicu*; 31(3): 311-321.

[5] Brown, J. D. (1996). *Testing in language programs.* Upper Saddle River, NJ: Prentice Hall Regents.

[6] Buckley, T.C., Parker, J.D. & Heggie, J. [2001]: A psychometric evaluation of the BDI-II in treatment seeking substance abusers. *Journal of Substance Abuse Treatment*, *20*, 197-204.

[7] Byrne B.M., Stewart S.M & Lee P.W.H., [2004]: Validating the Beck Depression Inventory II for Hong Kong Community Adolescents. *Int J Testing* 4:199–216.

[8] Campbell, D. T., & Fiske, D. W. [1959]: Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, 56(2), 81–105

[9] Charles D. [2005]: A hitchhiker's guide to reliability. New Zealand Council for Educational Research; 59-60.

[10] Coelho, R., Martins, A. & Barros, H. [2002]: Clinical profiles relating gender and depressive symptoms among adolescents ascertained by the Beck Depression Inventory II. *European Psychiatry*, *17*(222-226).

[11] Cronbach, L. J. [1951]: Coefficient alpha and the internal structure of tests. *Psychometrika,*   16: 297-334.

[12] Cronbach, L. J., & Meehl, P. C. [1955]: Construct validity in psychological tests. Psychological Bulletin, 52, 281-302.

[13] Davenport, E., & El-Sanhury, N. [1991]: Phi/ Phimax: Review and Synthesis. *Educational and Psychological Measurement;* 51, 821–828.

[14] Downing S.M. [2004]: Reliability: on the reproducibility of assessment data. *Medical Education*; 38: 1006-1012.

[15] Dozois, D.A., Dobson, K.S. & Ahnberg, J.L. [1998]: A psychometric evaluation of the Beck Depression Inventory-II. *Psychological Assessment*, *10*, 83-89.

[16] Gintinga, H., Näringa, G., Velda, W. M., Srisayektic, W & Beckera, E. S., [2013]: Validating the Beck Depression Inventory-II in Indonesia's general population and coronary heart disease patients. *International Journal of Clinical and Health Psychology* 13: 235−242.

[17] Grothe, K.B., Dutton, G.R., Jones, G.N., Bodenlos, J., Ancona, M. & Brantley, P.J. [2005]: Validation of the Beck Depression Inventory-II in a low-income African American sample of medical outpatients. *Psychological Assessment*, *17*, 110-114.

[18] Gupta S. Shrivastava P., Samsuzzaman Md., Banerjee N., and Das D.K. [2021]: Developmental delay among children under two years of age in slums of Burdwan Municipality: A cross-sectional study. *Journal of Family Med Prim Care*. 10(5): 1945–1949.

[19] Kapci, E. G., Uslu, R., Turkcapar, H & Karaoglan, A.,[2008]: Beck Depression Inventory II: Evaluation of the psychometric properties and cut-off points in a Turkish adult population. *Depression and anxiety* 25: 104–110 .

[20] Karen B. G., Gareth R. D., Glenn N. J., Jamie B., Martin A & Phillip J. B. [2005]: Validation of the Beck Depression Inventory—II in a Low-Income African American Sample of Medical Outpatients. *Psychological Assessment*. 17(1), 110–114

[21] Kojima M., Furukawa T. A., Takahashi H., Kawai M., Nagaya T & Tokudome S., [2002]: Cross-cultural validation of the Beck Depression Inventory-II in Japan. *Psychiatry Research*, 110: 291-299.

[22] Kumar, G., Steer, R.A., Teitelman, K. B. & Villacis, L. [2002]: Effectiveness of Beck Depression Inventory-II subscales in screening for major depressive disorders in adolescent psychiatric inpatients. *Assessment*, *9*(2), 164-170.

[23] Leigh, I.W & Tolbert, A. S., [2001]: Reliability of the BDI-II with deaf persons. *Rehabilitation Psychology*, 46: 195- 202.

[24] Musawi, N. [2001]: Psychometric properties of the Beck Depression Inventory-II with university students in Bahrain. *Journal of Personality Assessment*, *77*, 568-579.

[25] Nunnaly, J. [1978]: Psychometric theory. New York: McGraw-Hill.

[26] Osman, A., Downs, W.R., Barrios, F.X., Kopper, B.A., Guttierrez, P.M. & Chiros, C.E. [1997]: Factor structure and psychometric characteristics of the Beck Depression Inventory-II. *Journal of Psychopathology and Behavioral Assessment*, *19*, 359-376.

[27] Osman, A., Kopper, B.A., Barrios, F., Gutierrez, P.M. & Bagge, C.L. [2004]: Reliability and validity of the Beck Depression Inventory-II with adolescent psychiatric inpatients. *Psychological Assessment*, *16*(2), 120-132.

[28] Quek K F., Low W Y., Razack A H & Loh C S., [2001]: Beck Depression Inventory (BDI): A Reliability and Validity Test in the Malaysian Urological Population. *Med J Malaysia* 56 (3), 285-292.

[29] Raes, F. [2010]: Rumination and worry as mediators of the relationship between self-compassion and depression and anxiety. *Personality and Individual Differences. 48*, 757-761.

[30] Rhee, M. K., Lee, Y. H., Park, S. H., Sohn, C. H., Chung, Y. C., Hong, S. K., Lee, B. K., Chang, P. L., & Yoon, A. R. [1995]: A standardization study of Beck depression inventory 1-Korean version (K-BDI): reliability and factor analysis. *Kor J Psychopathol; 4*(1): 77-95.

[31] Schulenberg, S.E. & Yutrzenka, B.A. [2001]: Equivalence of computerised and conventional versions of the Beck Depression Inventory-II (BDI-II). *Current Psychology*, *20*, 216-230.

[32] Smith, C. & Erford, B. T. [1998]: Test review: Beck Depression Inventory II. *Association for Assessment in Counseling Education.*

[33] Sprinkle, S.D., Lurie, D., Insko, S.L., Atkinson, G., Jones, G.L. & Logan, A.R. [2002]: Criterion validity, severity cut scores and test-retest reliability of the Beck Depression Inventory-II in a University counselling centre sample. *Journal of Counseling Psychology, 49*(3), 381-385.

[34] Steer, R.A. & Clark, D.A. [1997]: Psychometric characteristics of the Beck Depression Inventory-II with college students. *Measurement and Evaluation in Counseling and Development*, *30*, 128-136.

[35] Steer, R.A., Kumar, G., Ranieri, W.F. & Beck, A.T. [1998]. Use of the Beck Depression Inventory-II with adolescent psychiatric outpatients. *Journal of Psychopathology and Behavioral Assessment*, *20*(2), 127-137.

[36] Steer, R.A, Ball, R., Ranieri, W.F. & Beck, A.T., [1999]: Dimensions of the Beck Depression Inventory-II in clinical depressed outpatients. *Journal of Clinical Psychology,* 55, 117-128.

[37] Steer, R. A., Rissmiller, D. J. & Beck, A. T. [2000]. Use of the Beck Depression Inventory-II with depressed geriatric inpatients. *Behaviour Research Therapy*, *38*, 311-318.

[38] Wang, Y.P., Andrade1, L.H & Gorenstein, C., [2005]: Validation of the Beck Depression Inventory for a Portuguese-speaking Chinese community in Brazil. *Brazilian Journal of Medical and Biological Research*. 38: 399-408.

[39] Ware, J.E. & Gandek, B., [1998]: "Methods for Testing Data Quality, Scaling Assumptions and Reliability: The IQOLA Project Approach", International Quality of Life Assessment, *J. Clin Epidemiol*, 51: 945-952.

[40] Whisman, M.A., Perez, J.E. & Ramel, W. [2000]: Factor structure of the Beck Depression Inventory-Second Edition (BDI-II) in a student sample. *Journal of Clinical Psychology*, *56*, 545-551.

[41] Wiebe, J.S.,   Penley, A & .A. F [2005]: The comparison Beck Depression Inventory-II. *Psychological English Assessment. 17(4),*481-485.

[42] Yule G. U. [1912]: On the methods of measuring the association between two attributes. *Journal of the Royal Statistical Society;* 75: 579-652