

ORIGINAL ARTICLE

**CONCURRENT VALIDITY AND EXPLORATORY  
FACTOR ANALYSIS OF THE MALAY VERSION OF  
CENTER FOR EPIDEMIOLOGIC STUDIES-DEPRESSION  
SCALE (CESD) AMONG MALAYSIAN ADOLESCENTS**

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**Abstract**

**Objectives:** The objective of this study is to validate the Malay version of the Centre for Epidemiologic Studies-Depression scale (CESD) among adolescents. **Methods:** Nine hundred and thirty-one adolescents completed the Malay version of CESD and Hopkins Symptom Checklist-depression scale (HSCL-depression). **Results:** Results showed that the internal consistency of both the scale as a whole and the subscales was highly consistent. The concurrent validity was established by examining the relationship between CESD with the HSCL-depression scale. It showed a significant correlation between the two scales. The factor structure was similar to that observed in previous studies in other samples. Three factors were extracted, which accounted for 48.4% of the variance: a depressive affect factor; a positive affect factor and somatic symptoms factor which were combined with interpersonal items. **Conclusion:** The Malay version of CESD with 20 items has satisfactory psychometric properties and can be used for Malaysian adolescents. *ASEAN Journal of Psychiatry, Vol. 17 (1): January – June 2016: XX XX.*

**Keywords:** CESD, Adolescents, Malaysia, Validity, Factor Analysis

**Introduction**

CESD is one of the most-used screening tools for depression among adolescents in Malaysia. Although CESD is not recommended as an individual diagnostic tool, this tool is widely used for the assessment and screening of depressive symptoms and is consistent with the DSM-IV diagnosis of major depression [1]. CESD is a 20-item self-report instrument to determine the frequency and the severity of current various depressive symptoms on a four-step Likert-scale. The score range of the CESD ranges between 0 and 60, with a cut-off score of 27 indicating high risk of developing depression [2].

Many studies were conducted to analyze the

psychometric properties of CESD among adolescents in different countries [3-6]. However, previous research on the CESD has some limitations. First, few studies investigated the screening properties of the CESD in non-English populations, and their results have been inconsistent [5,7,6]. Second, although the Malay version of the CESD had previously been used for several studies, it has never been systematically validated within a community adolescent sample [8, 9]. Only one study was found to establish the reliability and validity of the translated version into Malay language [10]. Mazlan and Ahmad [10] surveyed a sample of female prisoners and found satisfactory validity and reliability for the Malay version of CESD. Three factors were extracted, accounting for 42.2% of the

variance. They proposed that factor 1 contained items representing somatic complaints, which explained 23.1%, factor 2 positive affect (10.6%) and factor 3 depressive affect (8.6%). However, Mazlan and Ahmad used a prison sample [10] that is generally associated with higher level of stress and limited freedom [11], potentially introducing sampling bias and restricting the generalizability of the results to a general population. The original purpose of CESD [1] is to measure depressive symptoms in the general population. Therefore, the present study proposes to validate a Bahasa Malaysia-version instrument in a general adolescent population.

## **Methods**

Data in the study were collected from a questionnaire survey with a total population of 931 adolescents aged 13 to 17 ( $M_{age}= 15$ ,  $SD=1.46$ ; 352 males, 579 females). Adolescents who took part in this study were from five different ethnic groups: Malays (34.8%), Iban (31.8%), Chinese (14.3%), Bidayuh (7.7%), and other ethnic minorities, including Indians, Kelabit and Melanau (11.4%). Of participants, 83.8% of the adolescents lived with both parents, 11.8% lived with a single parent, and 4.4 % were in other living conditions such as with their grandparents, relatives or within an institution.

Following ethical approval from Faculty of Medicine and Health Sciences, University Malaysia Sarawak Ethical committee, the Malaysian Ministry of Education, and Sarawak Education Department, thirty schools were invited to take part in the study, of which seventeen agreed. Written consent from their guardians was obtained. Participants were briefed on the purpose of this study and their rights as respondents.

## **Measures**

**Socio-demographic Questionnaire.** A one-page survey design was used to solicit information regarding age, gender, ethnicity and living arrangements of the respondents.

**Center for Epidemiology Study Depression Scale (CESD).** The CESD includes 20 items

comprising six scales measuring major dimensions of depression: (1) depressed mood, (2) feelings of guilt and worthlessness, (3) feelings of helplessness and hopelessness, (4) psychomotor retardation, (5) loss of appetite, and (6) sleep disturbance. A cut-off score of 27 was used for this population [12], which is able to discriminate between a healthy sample and a clinical sample of adolescents. High internal consistency has been reported for the original English-language version (Cronbach's alpha coefficients = 0.85 to 0.90 [1].

**The Hopkins Symptoms Checklist-25 (HSCL-25) depression scale.** The HSCL is a 25-item self-report inventory that assesses symptoms of anxiety (items 1 –10) and depression (items 11 - 25) on a 4-Likert scale [13]. In the present study, only the HSCL-depression scale was used. A cut-off score of 1.75 was used to identify clinically significant symptoms in a South East Asian population. The internal consistency of this questionnaire in the present study was high ( $\alpha = 0.90$ ).

## **Translation**

For this study, all instruments were translated into the Malay language (Bahasa Malaysia) and were back-translated by two academicians who are experts in both English and Malay languages. The content validity and reliability of the translated version were evaluated and tested before the actual study was conducted.

## **Statistical analysis**

All analyses were conducted using the Statistical Program for the Social Sciences (SPSS, version 16.0) package [14]. Data were double entered to identify data entry errors. A descriptive analysis of frequency, means, and standard deviations of socio-demographic characteristics and depression scores (CESD and HSCL-depression) were analysed. To explore relationships with other socio demographic (categorical data), Pearson's Chi-square test was used. A  $p$ -level of 0.05 was interpreted as significant. The internal consistency of the CESD was assessed using Cronbach's alpha coefficient and correction between items. The correlation between the score of CESD and HSCL-depression was used to indicate the concurrent validity. In

order to determine the number of CESD factors for our sample, Exploratory Factor Analysis (EFA) with Principal Components Analysis (Varimax Normalized Rotation) was performed, and factor coefficients and scores were calculated.

**Results**

Of the 931 adolescents, 238 (25.6%; 169 females and 69 males) of the adolescents reported significant depressive symptoms. There was significant difference between genders,  $\chi^2 = 10.57, p = 0.001$ . Females (29.2%) had higher frequencies of depressive symptoms than males (19.6%). Detailed results on the prevalence of depression as measured by CESD will be reported in a separate paper.

**Internal consistency and split half reliability**

Cronbach's alpha indicated good internal consistency for the overall CESD scales ( $\alpha = 0.85$ ). Cronbach's alpha indicated good internal consistency for three CESD subscales; somatic subscale ( $\alpha = 0.74$ ), depressive affective subscale ( $\alpha = 0.82$ ), positive affective subscale ( $\alpha = 0.73$ ), and acceptable internal consistency for the interpersonal subscale ( $\alpha = 0.66$ ). The split-half reliability of the scale for the first half and second half was 0.71 ( $n = 10$  items) and 0.78 ( $n = 10$  items) respectively. The correlation coefficient between the two halves is 0.72. This showed that the split-half reliability of the scale was good.

**Construct and concurrent validity**

Bivariate correlation analysis showed that the somatic, depressive, and interpersonal subscales were well correlated between one another; somatic with depressive affective ( $r =$

0.75,  $p < 0.001$ ), somatic with interpersonal ( $r = 0.54, p < 0.001$ ), and depressive affective with interpersonal ( $r = 0.65, p < 0.001$ ). The positive affective subscale revealed significant negative correlation with the negative affective of the scale ( $r = -0.11, p = 0.001$ ) and with the interpersonal subscale ( $r = -0.09, p = 0.007$ ). Only the somatic and positive affective correlation was not significant ( $r = 0.05, p = 0.137$ ). As such, these subscales appeared to contain items that reliably identify common core variables, thereby implying construct validity. A visual inspection of the correlation matrix showed that all the items correlated with one, another and none of the items correlated very highly (0.90) nor very low ( $< 0.25$ ) which diminished the concern for singularity of the questionnaire [15]. No item in the questionnaire needed to be eliminated to improve the reliability of the questionnaire [16].

Concurrent validity of the CESD was analyzed with another measure of depression (HSCL-depression). The results from the bivariate correlation revealed significant correlation between CESD with the HSCL-depression scale ( $r = 0.68, p < 0.001$ ) and accounted for 46% of the variance. This result supports the concurrent validity of the CESD. The recommended cut off score for CESD is 27 [12].

**Factor Analysis**

An exploratory factor analysis with varimax rotation conducted on CESD items showed that the Kaiser-Meyer-Olkin index of sampling adequacy for CESD was .91, which is above the recommended value of .60. Barlett's test of sphericity for each alternative form was significant for the sample ( $\chi^2 (190) = 5880, p < .001$ ). These indicated that the data represented a homogeneous collection of variables that were suitable for factor analysis.

**Table 1. Total variance explained based on Principal component analysis for CESD scale**

Factor	Eigenvalue	Percentage (%) for variance	Cumulative %
1	6.17	30.85	30.85
2	2.36	11.81	42.660
3	1.14	5.71	48.37

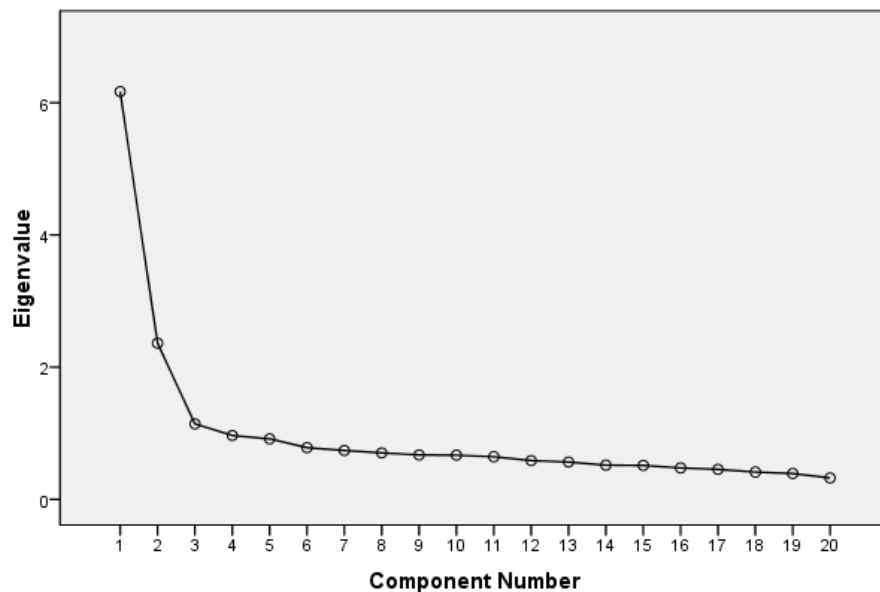
**Table 2. Factor loadings based on principle component analysis with varimax rotation for items that loaded, each question was rated by 931 participants**

	Factor loading			
	1	2	3	Communality
14. I felt lonely.	<b>0.755</b>	0.188	0.073	0.61
19. I felt that people dislike me.	<b>0.754</b>	0.158	0.028	0.59
15. People were unfriendly.	<b>0.729</b>	0.073	0.083	0.54
18. I felt sad.	<b>0.635</b>	0.362	0.154	0.56
20. I could not get going.	<b>0.597</b>	0.306	-0.116	0.46
17. I had crying spells.	<b>0.567</b>	0.368	0.056	0.46
13. I talked less than usual.	<b>0.494</b>	0.226	-0.026	0.30
10. I felt fearful.	<b>0.472</b>	0.417	0.038	0.40
9. I thought my life had been a failure.	<b>0.469</b>	0.35	-0.188	0.38
2. I did not feel like eating; my appetite was poor.	0.03	<b>0.729</b>	0.014	0.53
1. I was bothered by things that usually don't bother me.	0.191	<b>0.614</b>	0.013	0.41
7. I felt that everything I did was an effort.	0.294	<b>0.582</b>	-0.178	0.46
3. I felt that I could not shake off the blues	0.303	<b>0.569</b>	0.216	0.46
11. My sleep was restless.	0.264	<b>0.558</b>	0.011	0.38
6. I felt depressed.	0.437	<b>0.551</b>	0.158	0.52
5. I had trouble keeping my mind on what I was doing.	0.331	<b>0.509</b>	-0.163	0.52
12. I was happy.	0.11	0.093	<b>0.785</b>	0.40
16. I enjoyed life.	0.056	0.005	<b>0.77</b>	0.64
4. I felt I was just as good as other people.	0.094	-0.005	<b>0.727</b>	0.54
8. I felt hopeful about the future.	-0.158	-0.071	<b>0.642</b>	0.44

*Note.* Boldface indicates highest factor loadings.

Three factors were extracted from the factor analysis with eigen-values bigger than one, explaining 48.37% of the total variance. Table 1 presents the variance explained via EFA, whereas Table 2 and Figure 1 show the items loadings on each of the extracted factors. Factor 1 accounted for 30.85% of the variance and contained nine items all characterised by depressive affect (e.g. I felt lonely, I felt sad). Factor 2 accounted for 11.81% of the variance and contained seven items all characterised by somatic symptoms (e.g. I did not feel like eating, my sleep was restless). Factor 3

accounted for 5.71% of the variance. Factor 3 consists of four items that include a general range of expressive items about positive affect (e.g. I was happy, I enjoyed life). These results provide supporting evidence for the construct validity of CESD. Internal reliability of the overall CESD scale was relatively high ( $\alpha = 0.86$ ). The CESD subscales, depressive affective ( $\alpha = 0.85$ ), somatic symptoms ( $\alpha = 0.78$ ) and positive affective ( $\alpha = 0.73$ ), showed high internal reliability. No item needed to be eliminated to improve the alpha for the three factors and the overall CESD scales.



**Figure 1. Scree plot based on principal component analysis for all the items (N=20). When factors up to the first sudden change in the slope of the curve were considered on the scree test plot, the factors could be extracted to three**

## Discussion

Results indicate the overall psychometric properties of this Malay language version of CESD are good. The internal consistency of the scale as a whole and its subscales are all good except for the interpersonal scale. This might be due to the small number of interpersonal items, only two, in the CESD [17]. The original English version of the CESD has an internal consistency of 0.85 [1] consistent with the present study. The pattern of the correlation obtained was consistent with Radloff [1] in which the positive affective and negative affective is negatively correlated.

The concurrent validity of the Malay version of CESD was established by examining the relationship between CESD with the HSCL-depression scale. The CESD was found to significantly correlate with HSCL-depression scale, showing that the Malay version of CESD has the ability to discriminate between populations that reported more depressive symptoms and those who reported less. Analyses of sensitivity and specificity in the context of concurrent validity were not included in the present study because both analyses could not be calculated since an

interview of randomized sample has not been carried out in this study [18].

The results also established the construct validity of the Malay version of the CESD. Results indicate three-factor structure, depressive affective, somatic symptoms, and positive affective. This is inconsistent with the original English version of CESD [1] that suggested a four-factor structure. The interpersonal factors in the English version (i.e. "I felt that people dislike me" and "People were unfriendly") were not found in the present study. The present finding was consistent with a previous validation study in the Malay language [10], which found a three-factor structure of CESD. Mazlan and colleague [10] also found that their sample perceived the item "People were unfriendly" as a depressive affective rather than an interpersonal factor. The present results concur that Malaysian adolescents perceived the two interpersonal items as depressive affective. Item 13 ("I talked less than usual") and item 20 ("I could not get going") that were categorized as somatic symptoms in the original CESD study also appeared as depressive affective items in the present study. Mazlan and colleague [10] found that item 13

was categorized as a somatic symptom, in line with the present study.

Previous studies have suggested that Asian adult populations prefer to report somatic symptoms rather than psychological symptoms [19, 20]. This is inconsistent with the results found during this study among adolescents. It may be that Asian adults tend to see reporting somatic symptoms as a more appropriate way to seek help from primary care services. Malaysian adolescents, on the other hand, may desire more attentions from others, but do not seek primary care services, leading to a tendency to report their somatic symptoms as depressive affective.

Results showed that many depressive affective and somatic subscale items were overlapping with each other. Studies have shown that Asian populations tend to report somatic symptoms over depressive affective symptoms when compared with non-Eastern populations [21, 22]. The overlapping effect corroborates Parker et al and Ryder et al, and suggesting cultural factors play a significant role in expression of depressive symptoms. The present study has shown that CESD is a reliable measure for assessing adolescent depression across a broad socio-demographic range, as no differences in ethnicity, parental education background and living condition were found to significantly affect results. The internal consistency, construct and concurrent validity demonstrated that the Malay version of CESD is effective and suitable to be used with a Malaysian population.

### **Limitations and Conclusion**

The Malay version of CESD still awaits an assessment of its test-retest reliability. Although the fifteen depression items of HSCL-depression are consistent with the DSM-IV diagnosis of major depression [23] [24] the HSCL was originally designed for the screening of PTSD [13]. As such, the instrument could benefit from testing with other well-studied depression scales such as the Beck Depression Inventory to further ascertain concurrent validity.

In conclusion, the overall result of the validity and internal consistency of the Malay version

of CESD showed that it was reliable and valid as a screening tool for depression among the Malaysian adolescent population. The present study provides further evidence on the feasibility of CESD as a tool for researchers and clinicians to assess depression among adolescents. Having an assessment tool in the Malay language for simple self-report of depression among the adolescent population also increases the possibility of early detection and further treatment or follow-up scheduling.

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