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## ORIGINAL ARTICLE

# Validating the Beck Depression Inventory-II in Indonesia's general population and coronary heart disease patients

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### KEYWORDS

BDI-II;  
Depression;  
Validity;  
Cut-off point;  
Instrumental study

**Abstract** This study assesses the validity and determines the cut-off point for the Beck Depression Inventory-II (the BDI-II) among Indonesians. The Indonesian version of the BDI-II (the Indo BDI-II) was administered to 720 healthy individuals from the general population, 215 Coronary Heart Disease (CHD) patients, and 102 depressed patients. Confirmatory factor analysis indicated factorial similarity across the three samples. Significant correlations between the Indo BDI-II and other self-report measures related to depression demonstrated construct validity of the Indo BDI-II. Furthermore, there was a highly significant difference in the Indo BDI-II scores between depressed patients and non-depressed participants. Internal consistency and re-test reliability of the Indo BDI-II were acceptable. The receiver operating characteristic (ROC) curve indicated that the cut-off point of the Indo BDI-II for a mild severity of depression in Indonesian population should be 17. We conclude that the Indo BDI-II is a valid measure of depression, both in the Indonesian general population and in CHD patients.

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### PALABRAS CLAVE

BDI-II;  
Depresión;  
Validez;  
Punto de corte;  
Estudio instrumental

**Resumen** Este estudio evalúa la validez y determina los puntos de corte del Inventario de Depresión de Beck -II (BDI-II) en Indonesia. La versión indonesia del BDI-II (BDI-II Indo) se administró a 720 personas sanas de la población general, a 215 pacientes con Enfermedad Coronaria (EC) y a 102 pacientes con depresión. El análisis factorial confirmatorio mostró similitud factorial de las tres muestras. Las correlaciones entre el Indo BDI-II y otras medidas de auto-percepción relacionadas con la depresión fueron significativas, mostrando la validez de constructo del Indo BDI-II. Además, la diferencia de puntuación del Indo BDI-II entre los participantes dep-

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rimidos y no deprimidos fue altamente significativa. La consistencia interna y la fiabilidad re-test fueron suficientemente altas. La curva ROC (receiver operating characteristic) indicó que el punto de corte de la BDI-II para el nivel de gravedad leve de depresión la población de Indonesia es igual a 17. En conclusión, el Indo BDI-II es una medida válida de depresión, tanto para la población general indonesia como en pacientes con EC.

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Depression has significant consequences in daily life and constitutes a major threat to chronic diseases, such as coronary heart disease (CHD). Accordingly, a recent science advisory from American Heart Association (AHA) recommended that depression should be screened in CHD patients. The prevalence of depression among cardiac disease patients in Southeast Asia, which is mostly represented by Indonesians, is 29.5% (Rosengren et al., 2004). In many other countries, the prevalence of depression in CHD patients is about 12% in male and 18.7% in female (Shanmugasegaram, Russell, Kovacs, Stewart, & Grace, 2012). The prevalence of depression in Indonesia among healthy female and male are 34% and 24%, respectively (Liew, 2012) which are higher than the prevalence in other countries (e.g., Hidaka, 2012; Kaplan et al., 2010; Wada et al., 2005). Furthermore, A study even claimed that 94% of Indonesians were depressed (Burhani, 2007). Such unrealistic estimate might be due to validity issues of the measure.

Despite the high prevalence of depression in Indonesia, there is no well-validated screening instrument of depression in this country. Wada et al. (2005) measured depression among Indonesian using the 15-item geriatric depression scale (GDS-15), but the GDS-15 has not been validated in Indonesia. Similarly, Liew (2012) measured depression using one question about general symptoms of depression, but the validation procedure of the measure was not reported in that study. A study among post-acute myocardial infarct patients in Jakarta (Herry, Suryadipradja, Shatri, & Prodjosudjadi, 2005) used the Beck Depression Inventory (BDI) as a measure, but information about the validity of the BDI was also not reported.

The Beck Depression Inventory-Second Version (BDI-II) is validated, inexpensive, quick, and most frequently used self-rating scale to assess depression (Demyttenaere & De Fruyt, 2003). The validity of the BDI-II in Indonesia should be determined since it is commonly used for diagnosis and research in this country (e.g., Widjaja et al., 2011). Moreover, validation of the BDI-II in cardiac patients is required since several studies have raised questions regarding the validity in this group of patients (e.g., Delisle, Beck, Ziegelstein, & Thombs, 2012; Di Benedetto, Lindner, Hare, & Kent, 2006; Low & Hubley, 2007). Previous studies indicated that the BDI-II does not perform uniformly in general populations and cardiac patients and stated that overreporting physical complains causes unnaturally high scores in CHD patients (Forkmann et al., 2009).

This study used multiple sources of evidence (Sireci, 2009) to validate the BDI-II in Indonesia (Indo BDI-II) among general population and CHD patients. We evaluated factorial structure of the Indo BDI-II across different groups (healthy people, CHD patients, and depressed participants).

Additionally, construct validity and discriminative power of the Indo BDI-II were investigated. Moreover, we calculated test-retest reliability and internal consistency of the Indo BDI-II. Finally, we proposed a suitable cut-off point for the Indo BDI-II.

## Method

### Participants and procedure

This study was approved by local ethical committee. We obtained informed consent from all participants before their participation. The Indo BDI-II and other questionnaires were administered to all participants.

There were three groups of participants in this study. Table 1 displays the all sample characteristics. The first group was 720 healthy participants ( $M$  age = 37.80;  $SD$  age = 10.40) who were self-reported to be mentally and physically healthy, recruited randomly using snow ball sampling techniques. Ninety-one participants from this group filled in the Indo BDI-II a second time after 3-5 weeks.

The second group comprises 215 CHD patients ( $M$  age = 49;  $SD$  age = 9.70) who were recruited from cardiology clinics in large hospitals in Bandung. They were diagnosed by cardiologists using at least one of the various diagnostic methods, such as coronary angiography, echocardiography, treadmill, and electrocardiogram. They were self-reported being not depressed. CHD patients and healthy participants were categorized as non-depressed individuals in this study.

Participants in the third group were 102 depressed outpatients ( $M$  age = 43;  $SD$  age = 12.20) who were recruited from the psychiatry clinics of the same hospitals as the second group. They were diagnosed by psychiatrists according to the Diagnostic and Statistical Manual-Fourth Edition criteria.

### Measures

All measures were translated to Bahasa Indonesia. The translation process complied with the standards set by International Test Commission Guidelines for Test Adaptation (International Test Commission, 2010). The original English versions of all questionnaires used in this study were translated into Bahasa Indonesia by two qualified translators who are Indonesians and lecturers in the English department of our university. They are fluent in English and have post graduate degrees from US and UK universities. Then, the Bahasa version of the measures were translated back into English by English native translators who have diploma in

Bahasa and have been living in Indonesia for more than 12 years. These translators were blind to the intent of all instruments.

A committee of experts, the first author and two lecturers in clinical psychology who are fluent in English and have more than 15 years of clinical experience, reviewed the original English versions, English back translation, and Bahasa versions of all questionnaires in order to produce a final translation of the questionnaires. Problems were found during review stage regarding text lengths, which were longer in the Bahasa version compared with the original English and English back translation versions. These problems occurred due to the limited amount of the emotional words in Bahasa. The committee made a consensus to prioritize the clarity of items, on top of the text lengths. Consequently, particularly for the BDI-II, some items (i.e., items 4, 12, 13, and 20) in the Indo BDI-II are longer than the original BDI-II.

- Beck Depression Inventory-II. The 21-item self-administered Beck Depression Inventory-II (BDI-II) assesses the severity of subjective depressive symptoms (Beck, Steer, & Brown, 1996). Each response is scored on a scale from 0 (*not*) to 3 (*severe*). The test covers cognitive (e.g., thoughts about past failure), emotional/affective (e.g., sadness) and somatic/vegetative (e.g., tiredness or fatigue) symptoms (Beck, Steer, Brown, & van der Does, 2002).
- Type D Personality Scale (DS14). DS14 was specifically developed to assess - Negative Affect (NA; 7 items), Social Inhibition (SI; 7 items), and Type D personality, that is defined as the joint tendency towards NA and SI (Denollet, 2005). The Indonesian version of DS14 (Ginting, Näring, & Becker, 2011) has a satisfactory Cronbach's alpha both for NA (.78) and SI (.75).
- Beck Anxiety Inventory. The 21-item self-administered Beck Anxiety Inventory (BAI) measures the severity of subjective anxiety symptoms (Beck & Steer, 1993). The BAI used in this study was shown to have Cronbach's alpha of .86, and is comparable to other studies (e.g., Muntingh et al., 2011).
- Life Orientation Test-Revised version (LOT-R). The 8-item LOT-R (Scheier & Carver, 1985) measures optimism. The Cronbach's alpha of the translated LOT-R is .78.
- Multidimensional Scale of Perceived Social Support (MSPSS). The MSPSS comprises three facets of support (friends, family, and significant others), and each facet measured with four items (Zimet, Dahlem, Zimet, & Farley, 1988). A sum of the three scales yields a global satisfaction with perceived support score. The Cronbach's alpha of the MSPSS in this study is .87, and is comparable to other studies (e.g., Pedersen, Spinder, Erdman, & Denollet, 2019).

### Statistical analysis

A multiple-group confirmatory factor analysis (CFA) was conducted using LISREL 8.8 to test whether the Indo BDI-II has the same factor structure across groups. We tested the configural invariance (Meredith, 1993) for the model of the BDI-II with three factors: somatic, affective, and cognitive (Beck et al., 2002). The full information maximum likelihood estimator was used to estimate the parameters. This

estimator is robust against violations of normality (e.g., Satorra, 1992).

We evaluated the construct validity of the Indo BDI-II by inspecting its correlations with the DS14, BAI, MSPSS, and LOTR scores. The ability of the Indo BDI-II to discriminate between depressed and non-depressed persons was tested using a one-way between subjects ANOVA by comparing the means on the Indo BDI-II between healthy participants, CHD patients, and depressed patients. This analysis was followed by post-hoc tests to identify which groups were different. We also conducted a receiver operating characteristic (ROC) curve analysis which is a common procedure to test discriminative power and to determine a cut-off point of a measure (e.g., Martínez-López et al., 2012). The area under the ROC curve (AUC) reflected the discriminative power of the Indo BDI-II.

To estimate the reliability of the Indo BDI-II, Cronbach's alpha coefficient was computed. Furthermore, test-retest reliability was determined by calculating the correlation coefficient between test and retest scores of the Indo BDI-II.

The cut-off point of the Indo BDI-II was determined by the highest rates of sensitivity and specificity in the ROC curve. In this study, sensitivity was the probability that depressed patients would have a positive test score, whereas specificity is the probability that non-depressed individuals (i.e., CHD patients and healthy participants) would have a negative test score. If all possible total scores of the Indo BDI-II are used as cut-off points, then points of sensitivity and specificity pairs will lie along a smooth curve known as an ROC curve.

To confirm the cut-off point from the ROC curve analysis, we used a modified version of the Angoff method (Hoffman, Tashima, & Luck, 2010). We asked 30 Indonesian depression experts to estimate the answers of patients with mildly and severely depressed on all items in the Indo BDI-II. The experts were clinical psychologists or psychiatrists who have clinical practice more than 15 years. All the experts have knowledge about the cut-off points of the original BDI-II.

### Results

Table 1 displays certain important observations. There were more men (71.20%) than women (29.80%) in the CHD group, and the women in this group were significantly more depressed ( $M = 13.20$ ;  $SD = 9.50$ ) than men ( $M = 10.90$ ;  $SD = 7.30$ ),  $t(213) = 1.9$ ,  $p = .054$ . Moreover, almost all participants (97.2% for the healthy group, 99.1% for the CHD group, and 100% for the depressed group) reported to be religious (i.e., Muslims, Christians, Catholics, Buddhist, or Hindus).

### Factorial structure

Multiple-group CFA resulted the value of root mean square error of approximation (RMSEA) = .049 (90% confidence interval [CI]: .044, .053), chi-square ( $\chi^2$ ) = 1002.87,  $df = 552$ . These results indicated that the latent structure of the Indo BDI-II was the same across groups. The cut-off value of RSMEA is  $< .08$  for adequate fit and  $< .06$  for an excellent fit RSMEA. The value of  $\chi^2/df$  in this study was

**Table 1** Mean (SD) for the Indonesian version of the BDI-II (Indo BDI-II) across participant characteristics.

	Mean (SD) for the Indo BDI-II			Mean comparison analysis		
	Healthy (N = 720)	CHD (N = 215)	Depressed (N = 102)	p	(df)	F
<i>Participants</i>	14.20 (9.7)	11.60 (8.1)	24.70 (12.1)	< .001	(2, 1034)	67.10
<i>Gender</i>						
Male	14.20 (10.7)	10.90 (7.3)	24.30 (12.4)	< .001	(2, 576)	37.20
Female	14.10 (8.6)	13.80 (9.5)	25.20 (11.9)	< .001	(2, 455)	30.60
<i>Education</i>						
>SHS	22.20 (9.8)	15.00 (2.7)	23.70 (12.9)	.477	(2, 39)	.70
SHS	14.40 (9.6)	10.00 (7.7)	25.80 (10.8)	< .001	(2, 670)	52.60
Diploma	11.30 (7.2)	13.20 (7.8)	23.10 (14.3)	.005	(2, 61)	426
Bachelor	13.80 (10.2)	12.00 (9.6)	15.80 (14.6)	.547	(2, 199)	.60
Graduate	8.80 (8.5)	12.20 (6.6)	–	.112	t(53)	1.60
<i>Employment</i>						
Student	14.60 (9.6)	–	20.60 (3.1)	.170	t(431)	1.40
Employee	14.60 (10.3)	10.50 (7.5)	24.60 (11.0)	< .001	(2, 232)	27.40
Professional	11.70 (9.9)	11.10 (7.3)	20.90 (14.9)	.047	(2, 76)	3.20
Entrepreneur	13.02 (9.6)	11.40 (6.9)	27.80 (12.2)	< .001	(2, 159)	23.20
House maker	12.50 (8.5)	16.70 (10.0)	24.60 (14.2)	.032	(2, 51)	3.70
Retired	–	10.50 (7.7)	24.10 (13.1)	< .001	t(72)	5.60

Note. CHD = Coronary Heart Disease; SD = standard deviation; SHS = Senior High School.

1.82, and  $\chi^2/df \leq 2$  is considered to be an excellent fit (Hooper, Coughlan, & Mullen, 2008). Correlations between the factors in each group were high. Correlations between the cognitive factor and somatic factor in healthy, CHD, and depressed groups were, .86, .78, and .73, respectively, whereas correlations between the cognitive factor and affective factor were .99, .99, and .86; and correlations between the somatic factor and affective factor were .93, .95 and .95. Factor loading of the items were between .36 and .73 in every group except for item number 9 (suicidal thoughts or wishes) and item number 21 (loss of interest in sex) in the CHD patients which were .17 and .29, respectively.

### Construct validity

For the total of all respondents, the Indo BDI-II shows a significantly positive correlation with the DS14 ( $r = .52, p < .01$ ) and with the BAI ( $r = .52, p < .01$ ) and a significantly negative correlation with the MSPSS ( $r = -.39, p < .01$ ) and LOT-R ( $r = -.46, p < .01$ ). Table 2 displays correlations between the Indo BDI-II (the total score as well as its factors) and those related measures in each group.

### Discriminative power

As shown in Table 1, the highest mean score of the Indo BDI-II was found in depressed patients. There was a significant difference in the Indo BDI-II mean score between the three groups,  $F_{(2, 1034)} = 67.10, p < .001$ . Post-hoc comparisons using the Tukey HSD test indicated that the Indo BDI-II mean score of depressed patients ( $M = 24.70; SD = 12.10$ ) was significantly higher ( $p < .001$ ) than the score of either CHD patients ( $M =$

11.60;  $SD = 8.10$ ) or healthy participants ( $M = 14.20; SD = 9.70$ ). This test also indicated that the Indo BDI-II mean score of CHD patients was significantly lower than that of healthy participants ( $p = .002$ ). Moreover, Figure 1 shows the area under the ROC curve (AUC) of the Indo BDI-II for healthy participants ( $AUC = .755, SE = .028, p < .001$ ) and CHD patients ( $AUC = .812, SE = .029, p < .001$ ), are both above .70. These analyses indicated that the Indo BDI-II has a high discriminative power.

### Reliability

Cronbach's alpha, estimated on all participants, was .90 for the total score (21 items) of the Indo BDI-II scale, .80 for the cognitive factor (7 items), .81 for the somatic factor (9 items), and .74 for the affective factor (5 items). These values indicate adequate to high internal consistency. Cronbach's alpha of the Indo BDI-II per group was .90 for healthy participants, .87 for CHD patients, and .91 for depressed patients. The test-retest correlation of the Indo BDI-II was significant ( $r = .55, p < .01$ ). The means between the first test (12.60,  $SD = 6.70$ ) and retest (10.50,  $SD = 6.10$ ) were moderately concordant.

### Cut-off point

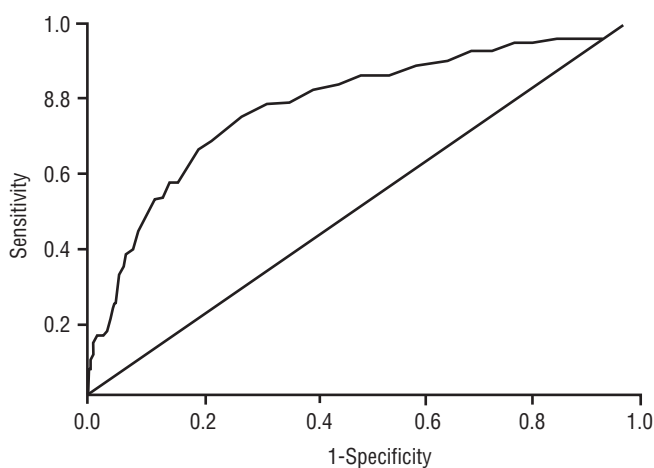
The differentiating value of the Indo BDI-II is optimal when the cut-off value is chosen at the point at which the ROC curve (Figure 1) in the nearest left upper corner. The per item sensitivity values which are plotted as a function of specificity values to help to determine the optimal cut-off point of the Indo BDI-II are shown in Table 3. The location of an optimal cut-off point is the point at which

**Table 2** Correlation between the Indonesian version of the BDI-II with other related measures per group.

Group	Total/Factors	DS14	BAI	MSPSS	LOT-R
Healthy	Total score	.48**	.35**	-.40**	-.32**
	Cognitive	.43**	.33**	-.37**	-.33**
	Somatic	.42**	.31**	-.39**	-.28**
	Affective	.42**	.29**	-.46**	-.31**
CHD	Total score	.37**	.40**	-.33**	-.39**
	Cognitive	.34**	.33**	-.34**	-.30**
	Somatic	.31**	.40**	-.22**	-.37**
	Affective	.37**	.39**	-.33**	-.41**
Depressed	Total score	.50**	.45**	-.45**	-.42**
	Cognitive	.51**	.41**	-.36**	-.34**
	Somatic	.45**	.45**	-.42**	-.35**
	Affective	.41**	.38**	-.47**	-.42**

Note. BAI = Beck Anxiety Inventory; CHD = Coronary Heart Disease; LOT-R = Life Orientation Test-Revised version; MSPSS = Multidimensional Scale of Perceived Social Support.

\*\* All correlations significant at the  $p < .01$ .



**Figure 1** Receiver operating characteristic curve of the Indonesian version of the BDI-II (AUC = .774, SE = .026,  $p < .001$ ).

the weight of sensitivity and specificity is equal (Kumar & Indrayan, 2011). The optimal cut-off point of the Indo BDI-II that best fits this rule is 17 (see Table 3). Applying this cut-off point, 73% of the depressed participants had been correctly identified as depressed by the Indo BDI-II and 73% of the participants both in healthy and CHD groups were identified correctly by the Indo BDI-II with a negative test result.

Of the 30 depression experts, 20 experts completed the Indo BDI-II as we requested. Cronbach's alpha coefficients from their scores were .91 both for mildly and severely depressed. We calculated the mean score of the experts answers for mildly depressed patients in the Indo BDI-II which was 24.90 ( $SD = 6.02$ ). The cut-off point was determined at one standard deviation below the mean (Carlson, Tomkowiak, & Stilp, 2009) which was 18.88, and it is comparable with the cut-off point from the ROC curve (i.e., 17).

**Table 3** Sensitivity and specificity values of the Indonesian version of the BDI-II at different cut-off points.

Cut-off point	Sensitivity (%)	Specificity (%)
3	96	10
4	96	14
5	95	18
6	94	22
7	93	26
8	92	30
9	90	36
10	88	41
11	86	46
12	85	51
13	83	55
14	81	60
15	79	65
16	76	69
17	73	73
18	70	76
19	67	78
20	63	80
21	59	82
22	57	84

Note. Dotted line indicates the cut-off point.

### Discussion

The overall pattern of results demonstrates the validity of the Indo BDI-II to be used as a screening instrument for depression in Indonesia. The construct validity of the Indo BDI-II was acceptable. As expected, the Indo BDI-II correlated negatively with the two opposite measures, the MSPSS and LOT-R, and correlated positively with two parallel measures, the DS14 and BAI. These findings are in accordance with earlier research which suggested that



depression is associated with anxiety (Muntingh et al., 2011), pessimistic explanatory style (Trivedi et al., 2009), Type D personality (Mols & Denollet, 2010), and deficit in social support (Pedersen et al., 2009).

The discriminative power of the Indo BDI-II is indicated by its ability to differentiate between depressed patients and non-depressed participants (healthy participants and CHD patients). Surprisingly, the mean score of the Indo BDI-II in healthy participants was higher than CHD patients. This difference might be due to a significant difference of their mean age. However, as expected, the mean Indo BDI-II scores of healthy participants and CHD patients were significantly lower than depressed patients. In addition, the AUC value of .755 for the healthy population and .812 for CHD patients demonstrate the power of the Indo BDI-II to distinguish between depressed and non-depressed individuals. These AUC values are comparable with recent findings (e.g., Nuevo, Lehtinen, Reyna-Liberato, & Ayuso-Mateos, 2009).

In this study multiple-group CFA was used to examine simultaneously the three factors model of the Indo BDI-II among depressed patients, healthy participants, and CHD patients sample. The results suggested factorial similarity across all groups for the three factors model (Beck et al., 2002). Score differentiation on the three factors (cognitive, somatic, and affective) of the Indo BDI-II might be relevant either for diagnosing individuals or evaluating interventions. However, based on the correlations between the three factors found in our study, it is reasonable to use a single depression score. This is in line with the primary aim of the BDI-II which is to measure the global construct of depression (Beck et al., 1996).

In our multiple-group CFA, all factor loadings were significant, thus indicating the good factorial validity of the Indo BDI-II parallel subscales. This finding is consistent with the findings by others (e.g., Beck et al., 2002; Tully, Winefield, Baker, Turnbull, & de Jonge, 2011). However, a low factor loading was found for item 9 (suicidal thoughts or wishes), particularly in the CHD patients ( $M_{\text{item9}} = .02$ ,  $SD = .18$ ). This is in contrast with the finding by Larsen, Agerbo, Christensen, Søndergaard, and Vestergaard (2010), who reported that the risk for suicide in CHD patients is high for at least 5 years after a cardiac event. However, almost all CHD patients in our study are religious, and it is possible that religion serves as a buffer for suicide risks (Stack & Kposowa, 2011). Moreover, CHD patients tend to be struggling to live longer, and thus are less likely to think of suicide.

Another low factor loading was also found for item 21 (loss of interest in sex) for CHD patients. This item seems to be ambiguous for CHD patients. CHD patients, even those who are sexually well-functioning, are often not satisfied and perceive themselves as incompetent to perform sexual intercourse (Johnson, 2004). They are often concerned about future sexual activities, diminished libido and the risk of having severe complications during sexual activities, even though the probability of a heart attack or even death during intercourse is very low (DeBusk, 2000). Such contradictions between subjective beliefs and reality might confuse CHD patients while answering questions about sex, and as such their responses may not have been consistent. In addition, the conservative culture of Indonesia

towards sexual issues may refrain from honest responding in questions about sex.

The reliability of the Indo BDI-II was good for the total of all participants ( $\alpha = .90$ ) and is comparable to that reported by Beck et al. (1996) for college students. The Cronbach's alpha values of the Indo BDI-II for each group were above .80 indicating satisfactory internal consistency of the scale for all three groups. The test-retest correlation ( $r = .55$ ,  $p < .01$ ) demonstrated moderate stability over a 3-5 week period. The moderate value of test-retest reliability was probably because the long interval between test and retest produced more measurement error (Yin & Fan, 2000). The interval should preferably be a two week period to be consistent with the test instruction that required respondents to indicate how they had been feeling during the past 2 weeks.

The average Indo BDI-II score for non-depressed participants in this study was higher than that given by Beck et al. (1996) for their sample ( $M = 12.55$ ,  $SD = 9.93$ ). If we apply their diagnostic ranges to our sample, i.e. a cut-off point equal to 10 or above, 64% of our participants would be suffered from mild to severe depression. But this prevalence seems unrealistic, given the fact that most Indonesians were able to face the various difficulties in the past few years, such as the changing economic conditions, uncertainties in socio-political situations, and the occurrence of natural disasters (World Health Organization [WHO], 2009). In addition, the suicide rate in Indonesia is lower than in other Asian countries such as Singapore, China, and India (World Health Organization [WHO], 2007). Therefore, the present study suggested using a BDI-II cut-off point that is suitable for use among the Indonesian population.

The results of this study suggested that the optimal cut-off point of the Indo BDI-II for mildly depressed was 17 both for the general population and CHD patients. Judgments from depression experts in Indonesia confirmed this cut-off point. Nuevo et al. (2009) recommended a cut-off point of 17/18 for the general population in Finland which is similar to ours. Using the new cut-off point, about 28% of our participants was mildly to severely depressed, a value that is comparable to the prevalence of depression in Indonesia reported by Liew (2012) and Wada et al. (2005).

Several limitations of this study deserve mention. First, the control group of healthy participants was drawn from a population for which only limited access to proper medical records. Participants in this group were categorized as healthy persons based on their own report. Second, this study used measures related to the BDI-II such as DS14, BAI, MSPSS, and LOT-R which were not comprehensively validated. They were translated from the original version and translated back to confirm the accuracy of translations. Internal consistency of those measures was however determined and reported in this study. Furthermore, lower order depression scales (e.g., *sadness*, *guilt*, and *joviality*) should be used to test the construct validity of the Indo BDI-II since these scales displayed clear specificity and have been shown to be strong predictors of depression (Watson, Clark, & Stasik, 2011). Finally, a sample of 102 depressed patients is sufficient for many analyses, but might be inadequate for factor analysis. More depressed patients should be recruited in future studies.

Limitations in this study might have caused several unexpected findings (e.g., healthy participants were more

depressed than CHD patients, moderate result in the test-retest correlation). Therefore more accurate and larger studies are needed to generate stronger support for validity and reliability of the BDI-II in Indonesia. Furthermore, larger studies in CHD and other life threatening diseases (e.g., cancer) patients should be conducted to standardize a measure that is culturally-sensitive for a better understanding of depression as a results of these medical conditions (Bardwell & Fiorentino, 2012).

Despite these limitations, the results in this study indicated that the Indo BDI-II is a reliable and valid instrument to assess depression, both in the physically healthy general population and in CHD patients. Specifically, using validated and inexpensive screening instruments, like the Indo BDI-II, among CHD patients in Indonesia is important since depression is a significant risk factor in CHD. As far as we know, this is the first study which establishes the validity and reliability of the BDI-II in Indonesia, both in a general population and in CHD patients. The findings, especially the adjusted cut-off point, can minimize the likelihood of poor treatment decisions or erroneous research conclusions concerning depression in Indonesia.

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