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Validity and Reliability of Beck Depression Inventory (BDI) Bahasa Melayu Version: A Pilot Study on Public Servants Having Symptoms of Depression

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Abstract---This pilot study was conducted to test the reliability and validity of the instrument to be used to assess the level of depression among public servants in the state of Selangor, Malaysia. The instrument used is the Beck Depression Inventory Bahasa Melayu Version. This instrument has two parts: Part A collects the demographic information and Part B has 21 items to measure depression. Although the basis of the existence of BDI is for use in clinical settings, there are many studies which have used BDI in non-clinical settings such as among university students and the general public. The BDI is empirically proven to be fit for use in both settings. A total of 30 public servants, who have been identified as a low performer at the Office of the State Secretary of Selangor, participated in this study. The Rasch Measurement Model using the Winsteps software version 3.72.3 was used to analyse the results. This Rasch analysis has shown that the reliability index of the Respondent obtained was 0.76 and the item reliability index was 0.83.

Keywords---beck depression inventory (BDI), depression, instrument, pilot study, reliability, validity.

Introduction

The competency of public servants and the level of service provided by them are among the pillars of the country's progress. Further, the quality of services provided by these public servants must meet the needs and requirements of consumers. To ensure the consistency and quality of service delivery, the public servants' physical well-being and mental health need to always be in the best condition so as to promote the highest commitment in service. Taking seriously all the factors that may negatively influence their performance, further assistance should be made available if they face issues in their daily life or any other problems that can affect their mental health while impacting the quality of their services. This pilot study was conducted to test the validity and reliability of the instrument that will be used to help public servants with symptoms of depression. There will be huge implications if depression among civil servants is not detected and treated early. Among them, the daily life functions of such individuals will be affected, whereby they would be unable to carry out their normal daily routines. Plus, the worst and most dangerous implication is the existence of suicidal feelings (Salleh, 2020).

The World Health Organization (WHO), reported that the increase in depression among the world population was more than 18 percent between 2005 and 2015, and it is estimated that more than 300 million people now suffer from depression. In Malaysia, four (4) out of ten (10) members of the public are estimated to have mental health problems. This figure is expected to continue to increase. There is a possibility that some of us are also included in the statistics due to the difficulty and indifference in identifying symptoms of depression that may exist within ourselves (Yee et al., 2015; Lerdal et al., 2014).

BDI is widely used worldwide, not only to assess the level of depression of a clinical patient but also used to screen for depression among the general population, since it was first developed in 1961. BDI has also been translated into various languages, and its validity and reliability have been tested in various cultural contexts. There were several studies that were performed using BDI to conduct screening in the context of non-clinical settings. For example, a study by Byrne et al. (1993), conducted on non-clinical adults using the French version of BDI, found that the data obtained were comparable to studies using clinical respondents with the reliability consistency technique of Alpha Cronbach of 0.80, and test-retest technique with a reliability of 0.74 (Byrne et al., 1993). Further studies performed by two researchers in Taiwan namely Yu & Yu (2007), had proven that BDI can be used in psychological studies as well as in other fields such as engineering. In addition, BDI has also shown a constant internal consistency both among clinical and non-clinical respondents (Albert, 2002).

In Malaysia, a survey study that was performed has proven that BDI can be used as an instrument to measure the level of symptoms among Malaysians (FMukhtar & Oei, 2011). In addition, the BDI Bahasa Melayu version has also been used as a tool for measuring depression among university students by another group of researchers (Ithnain et al., 2018). The results of this research show that the Bahasa Melayu version of the BDI worked well in the Malaysian society. Other research using the BDI Bahasa Melayu version in Malaysia included a survey

among medical students in a Malaysian Private University, which also resulted in good results on the study of both the prevalence of depression and its contributing factors amongst the students (Fuad et al., 2016). Most BDI studies in Malaysia were conducted on students, parents, spouses, and clinical patients (Byrne et al., 1994; Lee et al., 2017).

The use of psychometric tests in screening and assessing depression has become one of the important elements in the process of diagnosis, intervention planning and treatment, and it has become one of the most efficient and cost effective methods to help those with depression (Bailey & Awang, 1992; Leite & Beretvas, 2005). Therefore, this study used the BDI as one of the tools to test the symptoms of depression among public servants to facilitate the development of a comprehensive intervention module to help this population (Lasa et al., 2000; Beck et al., 1988).

Rasch measurement model

The Rasch Measurement Model was introduced by a Danish mathematician named Georg Rasch in 1960. This model is a new paradigm that aims to provide a guideline and technique to enable an objective measurement of latent traits of data that may not be explained by other theories or models (Richter et al., 1998; Quek et al., 2001). The measurement scale that can be measured by the Rasch Model is not only the percentage and the highest number of a score, but it also produces a measurement that allows us to measure the latent nature of data that have been obtained. Normally, only the Alpha Cronbach value is used as an indicator to determine the reliability of an instrument. However, by using this Rasch Model, analysis of the data obtained can prove the quality of the items and constructs studied to further strengthen the validity of a survey instrument. In addition, using the Rasch Model enables the researcher to identify and see the position of the item more specifically and also the level of the ability of the respondents to provide answers to the item according to the level of difficulty of the item. This means that the Rasch Model can also produce a fit statistical analysis (Bambang & Wahyu, 2015).

The Rasch Measurement Model assists researchers in the social sciences field through five (5) principles: namely, this model is able to provide a uniform linear scale in the instruments used, overcome data loss in studies, estimate accuracy, detect misfit items and data, and allow replication to be done. If a study has good data analysis results, it indirectly illustrates that the method chosen to analyse the data is accurate. Accordingly, the Rasch Measurement Model will be used as a method of data analysis from this pilot study of the BDI instrument to produce good and accurate findings. The analysis to be reported in this study includes reliability index, item validity criteria for BDI, misfit item and item polarity (Altar, 1999; Riggs et al., 1995).

Objective of the study

The objective of this pilot study is to test and determine the validity and reliability of the BDI Bahasa Melayu version among public servants and ensure the suitability of its function in the actual study later (Steer et al., 1999; Gregory,

2004). Also, through this study, the researcher will test the functionality of each item in the instrument as a whole, in terms of its reliability, namely the ability of the item to measure the construct that the researcher wants to measure (Hansen et al., 1984; Buysse et al., 1989).

Research Methodology

Sample of study and collection of data

This pilot study involved a total of 30 public servants who had been identified as low performers from all departments under the administration of the Selangor State Secretary Office (SUK). The BDI Bahasa Melayu version was distributed face-to-face and self-administered by the researcher to the respondents before they underwent special courses for low performing officers organized by the Counseling and Psychology Management Division, SUK. The definition of low performance is an officer with an Annual Performance Appraisal Report (LNPT) score of below 75% for the year 2017 (Jones, 1996; Karanges et al., 2015).

Instrument of study: the beck depression inventory (BDI) bahasa Melayu version

The BDI has 21 multiple choice answer items (MCQ) with a Likert Rating of 0-3. The BDI was founded by a Psychiatrist from the University of California, Dr. Aaron T. Beck. BDI was specially designed for clients aged 13 and over. The BDI has been revised in two versions. The original version was published in 1961, and was then revised in 1978, known as the BDI-IA. The second version was published in 1996, and known as the BDI-II. The BDI version used in this study has undergone a back-to-back translation process into Bahasa Melayu or the Malay language by a group of researchers, Firdaus Mukhtar and Tian PS Oei in 2008. The study on the adaptation of the BDI into the Malay language was performed on a group of 1090 respondents in four categories of participants: namely students, the general public, general medical patients, and patients with major depressive disorder. The researcher has obtained an official permission from them to use the Malay version of the BDI in this study. This BDI Bahasa Melayu version is fit for use with the Malay population in Malaysia (Mukhtar & Oei (2011), given that this study is a pilot study for the actual study which will be conducted on civil servants in Selangor, who are generally Malays (Lu et al., 2001; Lee et al., 1991).

Each item in the BDI is followed by 4 statements ranging from a Likert-rating of 0 to 3, and Respondents were asked to select the most significant statement in relation to their condition in the last 2 weeks. A score of 0, means no symptoms at all while the highest score of 3, indicates severe symptoms. The score range is between 0-13 for minimal depression, 14-19 for normal depression, 20-28 for moderate depression, and 29-63 for severe/serious depression. Referring to the guidelines outlined in the BDI, anyone with a score of 11 and above is indicated as having depressive symptoms (Sherina & Kaneson (2003), hence the individual is required to seek treatment to prevent the symptoms from becoming worse (Sidek, 1998; Jailani, 2011).

The BDI is also an instrument developed to measure symptoms related to cognitive, behavioral, emotional, and somatic components in depression (Byrne, Baron & Campbell, 1993). BDI can also be used as an indicator of depression or symptoms of depression. In addition, it also has the ability to measure the criteria for depression as outlined in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), published by the American Psychiatric Association in 2013. The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) has outlined nine main symptoms of depression, and additional criteria for diagnosis including if an individual experiences at least five symptoms for a week or more, and experience changes from the past such as significant mood swings or loss of interest and excitement in life. The nine symptoms are as follows:

- Depressed mood most of the day, nearly every day, as indicated by either a subjective report (e.g., feel sad, empty, hopeless) or observation made by others (e.g., appears tearful). (Note: In children and adolescents, can be irritable mood.)
- Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation).
- Significant weight loss when not dieting or weight gain (e.g., a change of more than 5% of body weight in a month), or decrease or increase in appetite nearly every day. (Note: In children, consider failure to make expected weight gain.)
- Insomnia or hypersomnia nearly every day.
- Psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings or restlessness or being slowed down).
- Fatigue or loss of energy nearly every day.
- Feelings of worthlessness or excessive or inappropriate guilt (which maybe delusional) nearly every day (not merely self-reproach or guilt about being sick).
- Diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others).
- Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.

Items tested in the BDI are divided into three (3) categories. The first is negative attitude that tests sadness, pessimism, dissatisfaction, punishment, self-criticism, isolation, crying, and suicidal feelings. The second category measures declining performance that tests failure, guilt, self-loathing, misery, doubt, self-image, and difficulty in making decisions. The third category is the somatic element which consists of sleep disorders, changes in appetite, weight loss, hypochondria, and loss of libido. These three categories have been divided into two sub-constructs namely cognitive-affective symptoms (items 1-13), and somatic symptoms i.e. items 14-21 (Mukhtar & Oei, 2011).

Analysis of data

This pilot study was analyzed using the Winsteps software version 3.72.3. Several analysis were performed to determine the functionality of the instrument (Mahmud et al., 2004; Yakub et al., 2020). This includes testing the distribution of data, value of item and respondent reliability, as well as the validity of the instrument. Isolation values for items and Respondents were also tested in this study (Widana et al., 2021; Vocroix, 2021).

Reliability index

Reliability is the nature of an instrument that is consistent in a measurement (Gregory, 2007). This means that the instrument used must have characteristics that are consistent with the various types of studies conducted, whether different cultures, populations and so on, so that the instrument is not biased and can be used properly. Reliability refers to the consistency of an instrument in providing a consistent and stable measurement even when tested multiple times. A study that can be generalized and able to make a precise and valid conclusion must have a high and acceptable coefficient value indicator (Norshuhada, 2019).

Using the Rasch Measurement Model, item reliability and Respondent reliability is visible. Reliability of Respondents is an index or value that indicates that the items found in the instrument used have been well distributed to all Respondents involved. While reliability of the item shows that the item is consistent if tested on other Respondents with the same amount and the same behavior. In this pilot study, the BDI was used, and the reliability results are presented in the table below:

Table 1
Item and respondent reliability index

Items	Reliability Index	Separation Power
Item	0.83	2.19
Respondent	0.77	1.84

Using the Rasch Measurement Model, the reliability value obtained for the item was 0.83 and for the Respondents was 0.77, with isolation values of 2.19 and 1.84 for the item and for the Respondent, respectively. Isolation values are values that indicate the production of strata levels according to identified abilities (Linacre 2005). It can be concluded that there are 2 levels of strata for the item, i.e. that the item is able to separate the Respondent into two (2) groups and the Respondent found the item has two (2) separator threshold in this BDI instrument. According to the Alpha Cronbach interpretation table, below, this pilot study using the BDI received a particularly good and effective level of reliability value with high consistency for items and a good and acceptable reliability value for Respondents.

Table 2
Alpha cronbach interpretation

Alpha Cronbach Value	Reliability Value Justification
0.8 – 1.0	Very good and effective with a high level of consistency
0.7 – 0.8	Good and acceptable
0.6 – 0.7	Acceptable
< 0.6	Item need repair
< 0.5	Item to be dropped

Criteria for validity and measurement

There are several conditions set to determine the validity and reliability of an instrument used in a study. Among the conditions that [Wright & Stone \(1979\)](#), have determined are: the use of valid items in the study and the items measure their constructs well, the concept and definition of constructs are clear and in line with the theory used, items tested on the right Respondent so that the results of the instrument analysis are consistent with the purpose of measurement, and use of valid response patterns. [Wright & Stone \(1979\)](#), also stated that if a valid response pattern could not be met, Respondents could not be accurately defined. Table 3 below shows the criteria for the item validity in BDI Bahasa Melayu version.

Table 3
Criteria for item validity in BDI Bahasa Melayu version

Criteria	Info Statistic	Result
Item Validity	<ul style="list-style-type: none"> • Polarity of item 	All items show positive value
	<ul style="list-style-type: none"> • Raw variance explained by measures 	35.5%
	<ul style="list-style-type: none"> • Unexplained variance in 1st contrast (noise) 	10.1%
	<ul style="list-style-type: none"> • Reliability of Respondent 	0.77
	<ul style="list-style-type: none"> • Reliability of item 	0.83
Distribution of Respondent	Estimated gap of respondents understanding MRPI	1.84
Distribution of Item	Estimated gap of item assessing construct that need to be measured	2.19

Misfit item

Five items have been identified as mismatched and can be dropped, following the performance of an analysis of misfit items (mismatched items). After dropping the 5 items, the latest analysis results obtained are as presented below and it turns out that the measurement index is better than the original BDI data. This item is also known as an outlier item. According to the Rasch Measurement Model, the evaluation of these fit items can be seen at the mean square and z-standard infit

values. The Mean square Infit range is 0.50 - 1.48 while the range for z-standard is $t = - + 2$ (Abdul et al., 2017). In addition, suicidal thought is reported to be the most difficult item for the BDI Malay version in this study while the simplest item is the feelings of being punished. 5 items that are not fit and dropped are presented in Table 4 below.

Table 4
Misfit item

Entry Number	Item	Infit		Status
		MNSQ	Zstd	
12	Hilang minat	1.52	2.0	Dropped
11	Sakit hati	1.80	3.0	Dropped
10	Menangis	1.71	2.4	Dropped
17	Terganggu	0.52	-2.2	Dropped
5	Rasa bersalah	0.43	-3.1	Dropped

Polarity of item

Point Measure Correlation values were looked into to determine item polarity. According to Bond & Fox (2013), if an item shows positive PTMEA Corr. value, this means that the item has measured the construct to be measured accordingly. Otherwise if the value is negative, this means that the item does not measure the construct and that the item with negative PTMEA Corr value should be dropped from the instrument. Linacre (2003), also states that if the value of Point Measure Correlation PTMEA Corr. for an item is negative or zero, this indicates that the binding response for that item is at odds with the construct to be measured. Nunnally & Bernstein, stated that if the value of PTMEA Corr. is $< .30$, that item is considered slack (Smorada et al., 2021; Haris et al., 2021).

Value of PTMEA Corr. was looked into to determine item polarity in this pilot study. Both polarity items were viewed using data before dropping 5 mismatched items. This means that a total of 21 items were looked into and subsequently 5 mismatched items were dropped. Both of these analysis that have been performed found that all PTMEA Correlation values were positive. This indicates that all of these items are able to measure the symptoms of depression to be measured. Although all items indicated a positive PTMEA Correlation value, the five (5) mismatched items identified from the analysis still need to be dropped to increase the level of reliability of these items and instruments to be used in the actual study later. Table 5 below shows a comparison of Point Measure Correlation values for all 21 items and 16 items after dropping the 5 misfit items.

Table 5
Comparison of PTMEA values corr. before and after dropping misfit items

Entry Number	Item	PTMEA Corr	PTMEA Corr
		21 Item	16 Item
11	Sakit hati	.14	-
12	Hilang minat	.26	-
8	Kritik diri sendiri	.28	.28

21	Libido	.32	.35
9	Fikir untuk bunuh diri	.36	.39
20	Risau keadaan fizikal	.38	.45
7	Tidak suka diri sendiri	.39	.38
1	Kesedihan	.39	.42
19	Masalah berat badan	.42	.51
6	Rasa dihukum	.45	.38
5	Rasa bersalah	.47	-
10	Menangis	.48	-
13	Sukar buat keputusan	.48	.50
18	Perubahan selera	.49	.57
15	Hilang tenaga	.51	.57
3	Kegagalan lalu	.52	.51
2	Pesimis	.52	.52
17	Terganggu	.54	-
4	Hilang kepuasan	.59	.58
14	Tak berguna	.60	.68

Based on Table 5 above, it can be concluded that after dropping 5 misfit items, PTMEA Corr. value for 16 items has seen an overall increase. This indicates that the item measures what it needs to measure according to (Bond & Fox, 2013).

Implication of Study & Conclusion

Based on the data analysis performed, the researcher found that there are 5 items that do not match (misfit items) in this instrument. The researcher chose to drop these misfit items so as to ensure that this BDI instrument will be able to measure more accurately in the actual study to be performed. These misfit items are also known as inaccurate items and outliers. 5 items that do not match and are dropped are presented in Table 4. Although there were previous studies performed to assess the reliability and validity of an instrument, the instrument still needs to undergo a validation process because the inference obtained is only suitable for the purpose and sample of the study at that time, in particular if the instrument is analyzed using the Classical Test Theory (CTT) or True Score Test Theory (TSTT) method. This pilot study had proven that the BDI Bahasa Melayu version can be used in the researcher's actual study after dropping 5 misfit items and outliers. Therefore, the researcher will only need to use 16 items in the actual study. This pilot study also empirically proved that the BDI Bahasa Melayu version can be used for non-clinical respondents (Hidir et al., 2021; Suputra et al., 2020).

Since the inception of BDI, a large number of research using the BDI have reported that the value of alpha coefficients exceeds 0.75. Very few studies have reported low alpha coefficient values. However, low alpha coefficients are usually also caused by inaccurate sampling effects, sample internal factors, as well as external factors such as the atmosphere, time, and place of study. Therefore, future studies need to focus on external factors, internal and sampling factors, and other factors to ensure the best research results that can be used as a reference in the future. The Rasch Measurement Model can report a misfit person i.e. an inappropriate respondent for the study conducted and such a participant

can be deleted or removed, so as to minimize the rate of interference in determining the results of the study. Therefore, the sampling factor that makes the value of alpha coefficient low in a study can be overcome by using this measurement method. In future studies, researcher can see the value of explained variance by measure, eigen value and noise (unexplained variance in 1st contrast) as an additional benchmark in reporting the results of the study as reported in Table 3 of this study.

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