

## ORIGINAL PAPER

## Psychometric Properties of the Depression Anxiety Stress Scale 21-item (DASS-21) Malay Version among a Big Sample Population of Non-Malays in Malaysia

*Ramli Musa<sup>1</sup>, Edre Mohammad Aidid<sup>2</sup>*

<sup>1</sup>Department of Psychiatry, Kulliyyah of Medicine, International Islamic University Malaysia, Jalan Hospital, 25150 Kuantan, Pahang, Malaysia

<sup>2</sup>Department of Community Medicine, Kulliyyah of Medicine, International Islamic University Malaysia, Jalan sultan Ahmad Shah, 25000 Kuantan, Pahang, Malaysia

**Introduction:** The Malay version of Depression Anxiety Stress Scale 21-item (M-DASS-21) has been tested in various populations in Malaysia. We are interested to look at the psychometric properties of the M-DASS-21 among Non-Malays in Malaysia. **Objectives:** This study aimed to analyse its psychometric values among non-Malays based on a big sample size. The analysis was based on Exploratory Factor Analysis and construct validity. **Methodology:** The data was captured through online web-based assessment. Incomplete entries and the Malay subjects were excluded and analysis was based on 33 655 completed entries which fulfilled the inclusion criteria. **Results:** We obtained Cronbach's alpha values of 0.92, 0.86 and 0.86 respectively for Depression, Anxiety and Stress domains. Rotated component analysis showed very good factor loadings for most items to their respective domains. All items displayed good factor loadings (>0.4) except 1 item. The non-fixed analysis showed the M- DASS-21 consisted of 2 domains and Stress items loaded equally to Depression and Anxiety domains. **Conclusion:** Results of this study show that the psychometric values of the M-DASS-21 among Non-Malays are good and the results reflex that M-DASS-21 is a valid and reliable tool for Non-Malays in Malaysia.

**Keywords;** Malaysians, Malay DASS-21, Non-Malay, Psychometric Values, Validation

### Background

There have been quite a number of publications on effort to validate the Malay version of Depression Anxiety Stress Scale 21 (M-DASS-21) in Malaysia [1-3]. Since the formal effort of translation into Malay

language happened about 14 years ago, the version has been widely used in Malaysia.

In the past studies, the psychometric values were established among general Malaysian population. Most of the subjects in the past studies were predominantly Malays with a

small portion of the subjects were Non-Malays. In those studies, Non-Malays were underrepresented [1-7]. There is no study to look specifically on the psychometric values of M-DASS-21 among Non-Malays in Malaysia. This study using a big Non-Malay subjects will shade a light on how good the psychometric values of M-DASS-21 among Non-Malays. This would provide an answer on how the Non-Malays understanding on the Malay version of DASS-21.

In term of versatility, DASS is available in Malay DASS-21, DASS-42 (original version), in Chinese (Mandarin) and also in Tamil. Based on studies mentioned above, the M-DASS-21 was found to be a reliable and valid tool for both hospital and non-clinical populations.

We assumed by providing the results on the psychometric values among Non-Malay population, would further strengthen the evidence that M-DASS-21 is reliable event among non-Malays.

### Methodology

The study was reviewed and fully approved by the internal review board of International Islamic University Ethics Committee. The committee decided that there was no necessity to obtain consent from respondents as the DASS test was open online and it was based on voluntary basis. Furthermore, all the responses remained anonymous.

We obtained the data through a public online survey and assessment at;

www.ramlimusa.com. The website has been established since 2018 and currently is receiving increased public attention. It is open to public and is accessible to anyone worldwide. Currently, it has received more than 13 million hits and a total of 790 000 visitors. Subjects who administered the M-DASS were captured by the system.

There are two inclusion criteria. Firstly, subjects must be aged 12-year-old and older (although the online scale could also capture the category of below 12-year-old) and secondly the Non-Malay respondents. The Non-Malay respondents and those who were not staying in Malaysia were excluded. The respondents' locations were identified by their IP numbers to know their place of staying. The analysis was only done on complete entries of the M-DASS-21.

The survey was consisted of 2 parts. First part was on respondents' demographic profile and the second part was the DASS-21 in Malay language.

### Results

As of January 2020, total number 570,997 visitors answered the M-DASS-21 (up to the time of analysis). Out of 570 997, only 368 958 completed the MDASS scale. We excluded Malay respondents and the number of Malays was 334 134, hence left non-Malay entries as 33 655. Therefore, the analysis was based on the final 33 655 completed entries.

**Table 1. Socio-demographic data of the respondents**

Variable	N (N=33 655)	Percentage (%)	Total
<b>Ethnicity of Non-Malays</b>			
Chinese	4040	12	33 655

Indian	2687	8	
Others	33 655	80	
<b>Gender</b>			
Male	27 160	80.7	33 655
Female	6 495	19.3	
<b>Age (years old)</b>			
12-17	2076	6.2	33 655
18-24	14 143	42.0	
25-34	12 839	38.2	
35-44	3 505	10.4	
45-54	842	2.5	
55-64	210	0.6	
65 and above	40	0.1	
<b>Marital status</b>			
Single	67 402	67.7	33 655
Married	25 794	30.1	
Divorced/widow(er)	1 533	2.3	
<b>Highest level of education</b>			
Primary school & no formal education	776	2.3	33 655
Secondary school	8 137	24.2	
College/university	24 742	73.5	
<b>Occupational status</b>			
Professional	10 528	31.2	33 655
Skilled	2 445	7.3	
Semi-skilled	3 636	10.8	
Students	11 948	35.5	
Unemployed	5 098	15.1	

Based on table 1, Majority of the subjects are from the category of others which includes Non-Malay Bumiputra and other natives (80%). Despite Chinese contribute to 25% of the actual Malaysian population in this study, Chinese represent only 12% to our total subjects (under-represented). Indians contribute up to 8% of our subjects. Based on Department of Statistics Malaysia [x], Malaysian population consists of Malays (67.4%), Chinese (24.6%), Indians (7.3%) and Others (0.7%). In term of

gender, 80.7 % of our respondents were females, and 67.7% were single. For the age, most (80%) of our respondents were young adults (aged between 18 to 34-year-old). As for socio-demographic profile, 73.5% of the subjects obtained tertiary education, 35% were students and 31% were professional workers.

#### *Analysis of Sample Adequacy*

The calculated Kaiser-Meyer-Olkin (KMO)

conformity measure is 0.97. Compared to the critical KMO value, the value of 0.97 is considered as very high and excellent. Bartlett Sphericity Test score for the same data was calculated as 426 810.8 and significant at  $p < 0.001$ . Similarly, Hotelling's T-squared value measured was 51 954. These values show that data obtained are very much suitable for factor analysis. The quantity of the sample is more than adequate for factor analysis.

### **Reliability**

M-DASS-21 demonstrated excellent internal consistency values. The overall Cronbach's alpha value is 0.95, and for each domain the values ranging from 0.92 to 0.85 (Table 2). All items consistently have high Cronbach's alpha values if item deleted ( $> 0.94$ ) (Table 3). This indicates that all items are important to be included in order to get an excellent overall Cronbach's alpha value (0.95). Scree plot shows that there are 2 factors/domains with Eigenvalue less than 1 (Figure I).

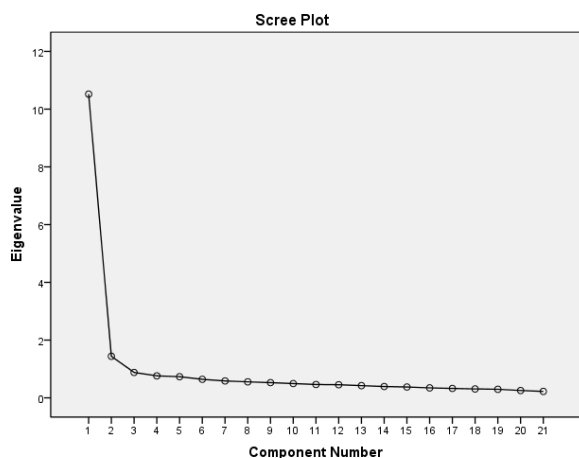
**Table 2. Reliability analysis (internal consistency) of the M-DASS-21**

<b>Domains</b>	<b>Items</b>	<b>Cronbach's alpha</b>
Overall	1-21	0.95
Depression	3,5,10,13,16,17,21	0.92
Anxiety	2,4,7,9,15,19,20	0.86
Stress	1,6,8,11,12,14,18	0.86

**Table 3. Scale mean, scale variance and Cronbach's alpha if item deleted**

<b>Items</b>	<b>Scale Mean if Item Deleted</b>	<b>Scale Variance if Item Deleted</b>	<b>Corrected Item-Total Correlation</b>	<b>Cronbach's Alpha if Item Deleted</b>
1-S	25.03	178.077	0.626	0.947
2-A	24.87	179.619	0.462	0.949
3-D	25.10	176.568	0.665	0.947
4-A	25.31	176.710	0.594	0.948
5-D	24.86	174.811	0.687	0.946
6-S	25.05	176.092	0.628	0.947
7-A	25.34	177.277	0.568	0.948
8-S	24.85	176.274	0.614	0.947
9-A	24.91	171.900	0.697	0.946
10-D	24.98	170.417	0.723	0.946
11-S	24.94	171.584	0.778	0.945
12-S	25.03	173.077	0.755	0.945
13-D	24.85	170.811	0.774	0.945
14-S	24.86	175.863	0.628	0.947
15-A	25.17	173.848	0.725	0.946
16-D	25.07	173.026	0.726	0.946
17-D	25.02	169.119	0.744	0.946

<b>18-S</b>	24.36	177.148	0.546	0.948
<b>19-A</b>	25.01	174.932	0.620	0.947
<b>20-A</b>	25.03	171.428	0.730	0.946
<b>21-D</b>	25.27	170.161	0.731	0.946



**Figure 1. The Scree plot of the rotated component**

**Validation Analysis**

The validation of M-DASS-21 is determined by using the Exploratory Factor Analysis (EFA). This approach aimed establish the construct validity of the scale by looking at factor loading of each item. We used rotated component analysis by using Varimax rotation.

The fix analysis of 3 domains/factors, found that all items load high factor loading values (>0.4) to their respective domains except for only one item, item no 18 (Table 4). The item 18 loaded on its respective domain (Stress) with value of 0.39 (less only 0.01 as the set standard). We set 0.4 as our expected good factor loading.

**Table 4. Factor Loadings based on Principal Component Analysis (fixed to 3 factors). Rotation Method: Varimax with Kaiser Normalization**

<b>DASS items</b>	<b>Depression</b>	<b>Anxiety</b>	<b>Stress</b>
<b>3-D</b>	0.61		
<b>5-D</b>	0.64		
<b>10-D</b>	0.81		
<b>13-D</b>	0.69		
<b>16-D</b>	0.75		
<b>17-D</b>	0.81		
<b>21-D</b>	0.81		
<b>2-A</b>		0.53	
<b>4-A</b>		0.75	

7-A	0.69	
9-A	0.41	
15-A	0.56	
19-A	0.76	
20-A	0.56	
1-S		0.64
6-S		0.73
8-S		0.56
11-S		0.45
12-S		0.55
14-S		0.69
18-S		0.39

We run second analysis without fixing the number of factors. The second analysis found 2 domains instead of 3. All items in domains Depression and Anxiety had nice

factor loadings in their respective domain (Table 5). However, Stress items were dividedly loaded between domains of Depression and Anxiety.

**Table 5. Factor Loadings based on Principal Component Analysis (non-fixed). Rotation Method: Varimax with Kaiser Normalization**

Items	Depression	Anxiety
3-D	<b>0.68</b>	
5-D	<b>0.69</b>	
10-D	<b>0.82</b>	
13-D	<b>0.74</b>	
16-D	<b>0.77</b>	
17-D	<b>0.83</b>	
21-D	<b>0.82</b>	
2-A		<b>0.48</b>
4-A		<b>0.72</b>
7-A		<b>0.71</b>
9-A		<b>0.59</b>
15-A		<b>0.72</b>
19-A		<b>0.74</b>
20-A		<b>0.63</b>
1-S	0.45	0.50
6-S	0.45	0.49
8-S	0.26	<b>0.68</b>
11-S	0.57	0.57
12-S	0.56	0.56
14-S	0.49	0.45
18-S	0.42	0.42

## Discussion

In this study, we are interested to look at the psychometric values of the DASS-21 Malay version among Non-Malays. The non-Malays racial category in Malaysia includes the ethnicity of Chinese, Indians and other Non-Malay Bumiputra such the natives in Sabah and Sarawak. It would be interesting to know on how much they understand the items in M-DASS-21. Previous publications were mainly analysing the psychometric values of Malaysian populations as a whole. There is no study to look specifically at the psychometric values of M-DASS-21 among Non-Malays in Malaysia.

Up to date, there are 8 publications in Malaysia related to DASS. The DASS-21 Malay version has been proven at least by 6 local studies, that it has good psychometric values for both reliability and validity [1, 4-8]. Another 2 studies in Malaysia are related to validation of the Malay version of DASS-42 item and English DASS-21.

Most of past studies did not record a substantial portion of Non-Malay respondents. A study by Ramli *et al* the Non-Malays were only represented of 6% (Malays represented 94% of their respondents) [5]. Rusdi Nordin *et al* conducted a validation study on M-DASS-21. Their subjects were among 402 at 2 large outpatient clinics in Johor. The study relatively has a good number of Non-Malay respondents (38%) (Chinese 18% (underrepresented), Indians 19% and 2% others) [7]. Non-Malays were also far underrepresented in a study by Nadia *et al*. Malays made up 94% of their 455 subjects which means Non-Malays were only 6% [8].

The only study that has high repetitive Non-Malays is Nadia MM *et al*. The total number of their respondents was 160 subjects. The

Non-Malays was majority which represented 57% of the subjects and Malays only 43%. Out of 57%, Chinese were 32%, Indians were 15% and other races were 10%. However no psychometric values were recorded for us to make any comparison to our findings.

There are several possibilities as to the reason why there was low presentative of Chinese in the past studies. Many studies were conducted at government health facilities such as health clinics and hospitals. Since Chinese are generally have better socio-economic status, they hardly utilizing the government facilities unlike Malays and Indians. Another reason is due to logistic reason. Certain studies were conducted at certain states in Malaysia which are predominantly reside by Malays. There is also difficulty in getting cooperation from them to participate in the study. It may also to the fact that it is difficult to get cooperations from Chinese respondents.

This current study shows that all items have very good factor loadings to their respective domains except item no18 (Stress). Comparing with other previous studies on Construct validity of M-DASS-21, results consistently showed that most items were loaded with good values to their respective domains [1, 4, 7].

The Cronbach's alpha values yielded by this study (0.95 to 0.86) are very a lot better than a few studies done in the past. In 2007, Ramli *et al* carried out a translation effort and they obtained Cronbach's alpha values of 0.84, 0.74 and 0.79 respectively for Depression, Anxiety and Stress domains [1]. Another study, also by Ramli *et al*, tested on the same DASS-21 version among diabetic patients. Results showed almost similar results (0.75, 0.74 and 0.79 respectively for Depression, Anxiety and Stress domains) as

compared to their previous study [4]. In a study done by Nordin *et al* with sample size of 402 respondents, they obtained Cronbach's alpha values of 0.86, 0.84 and 0.85 respectively for Depression, Anxiety and Stress. Their overall value Cronbach's alpha value was 0.84 [7].

Based on comparisons above, our study shows clearly that reliability values are much better than previous studies. This excellent value of internal consistency (Cronbach's alpha) could be contributed by our bigger sample size. The highest number of subjects recorded on validation studies in Malaysia was not more than 500 subjects. This study with a total of 33 655 subjects is equivalent to 67 times more than the previous numbers of subjects.

The non-fixed analysis showed there were only 2 domains. The factor loadings of Stress items were equally divided between Depression and Anxiety domains. This is a new and an interesting finding. This is in line with theoretical explanation that stress symptoms are overlapping of anxiety and depression symptoms [9].

### Conclusion

Based on Cronbach's alpha values of overall and each domain and factor loading of each item, we conclude that the DASS-21 Malay version has good psychometric values among Non-Malays and the values such as Cronbach's alpha are even much better than many studies in the past in Malaysia.

The DASS-21 Malay version is proven to be reliable and valid for Malaysians. This study also proved that Stress items are actually an overlapping entity between Depression and Anxiety domains. It is recommended for future studies to utilize the M-DASS toward non-Malay population more to get the actual

burden of depression, anxiety and stress of Malaysians.

### Acknowledgement

We would like to expression our heartfelt appreciation to Mr. Mas Asyraf Elias for his contribution in designing the website and extracting the data.

### References

- [1] Musa, R., M.A. Fadzil, and Z. Zain, *Translation, validation and psychometric properties of Bahasa Malaysia version of the Depression Anxiety and Stress Scales (DASS)*. ASEAN J Psychiatr, 2007. **8**(2): p. 82-9.
- [2] Ramli, M., S. Rosnani, and A.F. AR, *Psychometric Profile of Malaysian Version of the Depressive, Anxiety and Stress Scale 42-item (DASS-42)*. Malaysian Journal of Psychiatry, 2012. **21**(1).
- [3] Edimansyah, B., B. Rusli, and L. Naing, *Reliability and construct validity of the Malay version of the Depression Anxiety Stress Scales (DASS) in automotive assembly workers in Malaysia*. J Malaysian Journal of Public Health Medicine, 2007. **7**(1): p. 25-30.
- [4] Ramli, M. and M. Salmiah, *Validation and Psychometric Properties of Bahasa Malaysia version of the Depression Anxiety and Stress Scales (DASS) among Diabetic Patients*. Malaysian Journal of Psychiatry, 2009. **18**(2).
- [5] Musa, R., et al., *Concurrent validity of the depression and anxiety*



*components in the Bahasa Malaysia version of the Depression Anxiety and Stress scales (DASS). ASEAN J Psychiatr*2011. **23**(5): p. 93-5.

[6] Azma, N.B., et al., *Psychometric properties of the Malay version of the Depression Anxiety Stress Scale-21 (M-DASS21) among nurses in public hospitals in the Klang Valley.* J International Journal of Collaborative Research on Internal Medicine, 2014. **6**(5): p. 109.

[7] Nordin, R.B., et al., *Construct validity and internal consistency reliability of the Malay version of the 21-item depression anxiety*

*stress scale (Malay-DASS-21) among male outpatient clinic attendees in Johor.* J Med J Malaysia, 2017. **72**(5): p. 265.

[8] Nadia, M., K. Brian, and H. Chee, *A Test of Validation for the Malay Version of the Depression, Anxiety and Stress Scales 21 (DASS21) in the Psychiatric Clinic.* J Malaysian Journal of Psychiatry, 2004. **12**(2): p. 44-50.

[9] Arnau-Soler, A., et al., *A validation of the diathesis-stress model for depression in Generation Scotland.* J Translational Psychiatry, 2019. **9**(1): p. 25.

### **Corresponding Author**

Dr. Ramli Musa

Professor, Department of Psychiatry,

Kulliyah of Medicine, International Islamic University Malaysia,

Jalan Hospital, 25150 Kuantan,

Pahang, Malaysia

**Tel:** +6091-5716400

**H/P:** +6017-9690111

**Fax:** +609-5133615

**Email:** ramlidr@yahoo.com / drramli@iiu.edu.my