

# 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

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## ABSTRACT

**Background:** The 21-item English version of the Depression Anxiety Stress Scale (DASS-21) has been proposed as a method for assessing self-perceived depression, anxiety and stress over the past week in various clinical and non-clinical populations. Several Malay versions of the DASS-21 have been validated in various populations with varying success. One particular Malay version has been validated in various occupational groups (such as nurses and automotive workers) but not among male clinic outpatient attendees in Malaysia.

**Objective:** To validate the Malay version of the DASS-21 (Malay-DASS-21) among male outpatient clinic attendees in Johor.

**Methods:** A validation study with a random sample of 402 male respondents attending the outpatient clinic of a major public outpatient clinic in Johor Bahru and Segamat was carried out from January to March 2016. Construct validity of the Malay-DASS-21 was examined using Exploratory Factor Analysis (KMO = 0.947; Bartlett's test of sphericity is significant,  $p < 0.001$ ) through Principal Component Analysis and orthogonal (varimax) rotation with Kaiser Normalization to confirm the psychometric properties of the Malay-DASS-21 and the internal consistency reliability using Cronbach's alpha.

**Results:** Construct validity of the Malay-DASS-21 based on eigenvalues and factor loadings to confirm the three factor structure (depression, anxiety, and stress) was acceptable. The internal consistency reliability of the factor construct was very impressive with Cronbach's alpha values in the range of 0.837 to 0.863.

**Conclusions:** The present study showed that the Malay-DASS-21 has acceptable psychometric construct and high internal consistency reliability to measure self-perceived depression, anxiety and stress over the past week in male outpatient clinic attendees in Johor. Further studies are necessary to revalidate the Malay-DASS-21 across different populations and cultures, and using confirmatory factor analyses.

## KEY WORDS:

*DASS-21; Malay-DASS-21; construct validity; internal consistency reliability; depression; anxiety; stress; male; outpatient clinic attendees*

## INTRODUCTION

Globally, there has been a significant rise of common mental health disorders. According to the World Health Organization (WHO), the percentage of people suffering from depression and/or anxiety has almost doubled from a total of 416 million in the year 1990 to 615 million in 2013.<sup>1</sup> This led to the development of the World Health Assembly resolution in May 2013 advocating for a nationwide comprehensive and synchronised response to these mental health disorders.<sup>2</sup>

Anxiety and depression are viewed as debilitating diseases and they can profoundly affect one's quality of life. Both disorders may not only impact the psychological wellbeing of an individual, but also result in other physical symptoms such as insomnia, restlessness and loss of appetite. Hence, undiagnosed and untreated symptoms may further heighten and lengthen psychological suffering and suicidal mind-sets among the general population. Therefore, effective screening is extremely vital to detect and solve such issues associated with anxiety and depressive symptoms.

The 21-item depression anxiety stress scale (DASS-21), developed by Lovibond and Lovibond, is a self-reporting tool designed to measure the psychological distress along the constructs of depression, anxiety and stress.<sup>3</sup> This is the shortened version of the 42-item depression anxiety stress scale (DASS-42) developed in 1995 which is able to provide the same structure as the full version but requires half the time to complete.<sup>3</sup> Additionally, the DASS-21 was also demonstrated to be more stable and distinctive compared to the DASS-42.<sup>4</sup> It has been extensively utilised in many different populations around the world such as Hispanic, American, and British adults as a vital research tool to measure these three main psychological aspects.<sup>5</sup> The single administration of this questionnaire allows researchers to gauge the incidence and relation of depression, anxiety and stress among their participants.

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Crawford et al., showed that the DASS-21 is psychometrically sound, with a good reliability and validity effectively used among the Western population.<sup>5</sup> It was broadly investigated for its reliability and validity across various nations such as Australia,<sup>6</sup> England<sup>5</sup> and Canada<sup>7</sup> in various languages including Spanish<sup>8</sup> and Chinese<sup>9</sup> with internal consistencies reliability (Cronbach's Alpha scores) ranging from 0.74 to 0.93. However, we still lack sufficient validation among Asian populations to establish the effectiveness of DASS-21 in detecting depression, anxiety and stress among the Asian culture. It is evident that the difference in culture and language may affect an individual's experience, understanding and expression.<sup>6</sup> Thus, applying Western based questionnaires in Asian settings by directly translating them without appropriate validation may result in false impressions and results.<sup>10</sup>

In recent years, the DASS-21 has been translated into multiple languages and has been validated in different Asian settings. At present, there are several Malay versions of the DASS-21 validated in various populations with varying success.<sup>11</sup> Ramli et al.'s, translation of the Malay version of DASS-21 was able to demonstrate good psychometric properties for the general Malaysian population.<sup>11</sup> One particular Malay version has been validated in various occupational groups (such as nurses and automotive workers) but not among male clinic outpatient attendees in Malaysia.<sup>12,13</sup> Further evidence is required to investigate the psychometric properties of this version in clinical settings. DASS-21 requires validation when applied across different populations<sup>10</sup> and different times; according to Boynton and Greenhalgh, reliable questionnaires yield consistent results from repeated samples and different researchers over time.<sup>14</sup> Hence, the necessity to re-validate the DASS-21 instrument prior to the study in order to ensure that the instrument is valid for the intended population.

Therefore, in this study, we aim to focus on the validity and reliability of the Malay version of DASS-21 (Malay-DASS-21) among male outpatient clinic attendees in Johor.

### Study design

This is a cross-sectional study design with simple random sampling. The study was carried out over a three-month period (January to March 2016) in two large outpatient clinics in Johor Bahru and Segamat. The sample size was determined on the basis of the recommended 10 participants per questionnaire item as suggested by Tabachnick and Fidell<sup>15</sup> for factor analysis. Thus, the total sample exceeded the minimum required sample size to analyse DASS-21's factor structure (i.e. 210 participants). Taking into account possible incomplete forms, a total of 402 participants were obtained.

### Inclusion criteria

The inclusion criteria were as follows: (1) male aged at least 18 years; (2) provided an informed consent; and (3) able to comprehend the Malay language questionnaire.

### Study instrument

The Malay version of DASS-21 was obtained from a previous study by Edimansyah et al.,<sup>13</sup> in which the original English version of DASS-21 was translated into Malay language by two trained research officers who were fluent in both Malay and English. A back translation was done that did not affect the construct of the instrument and this was then tested to assess its face and content validity among Malaysian automotive workers. This was then edited accordingly to make it more understandable to be used among the Malaysian population. This questionnaire has since been used and validated in various other populations including nurses<sup>12</sup> demonstrating varying reliability and validity, respectively. However, a few other validation testing was not carried out such as test-retest reliability, discriminant validity and Kappa agreement analysis.

### Study procedure

After explaining the study objectives and handing over the explanatory statements, the subjects signed the Informed Consent Forms. The researchers distributed the Malay DASS-21 questionnaires among the subjects and collected them upon completion. Approximately 15-20 minutes was necessary to complete the Malay-DASS-21.

### Psychometric properties of the Malay-DASS-21

Psychometric properties of the Malay-DASS-21 were confirmed using exploratory factor analysis (EFA) [principal component analysis (PCA) with orthogonal varimax rotation and Kaiser Normalization for construct validity] and internal consistency reliability analysis (Cronbach's alpha).

### Ethics approval

Ethics approval was obtained from the Ministry of Health, Malaysian Research Ethics Committee [MREC: NMRR-15-904-25433 (IIR)] and the Monash University Human Research Ethics Committee (MUHREC: CF15/4233 - 2015001813). Permission to conduct the study was also obtained from the outpatient clinics in Johor Bahru and Segamat.

### Statistical analysis

Data was checked for completeness and normality was checked using the Kolmogorov-Smirnov test. Descriptive statistics were examined using numbers and percentages for categorical variables, and means and standard deviations for normally distributed variables (medians and interquartile ranges for non-normally distributed variables). For EFA, factor extraction using PCA with orthogonal varimax (Kaiser Normalization) rotation was used. The Kaiser-Meyer-Olkin (KMO) test for sampling adequacy and Bartlett's test of sphericity were examined before proceeding with further analysis. A three-factor solution was indicated and factor loadings were examined for each of the three factors. For internal consistency reliability, the Cronbach's alpha scores for the overall dimensions (21-items) and each dimension (7-item depression, 7-item anxiety, and 7-item stress) were assessed. All significant results were based on  $p < 0.05$ . Analysis of the data was carried out using the IBM- Statistical Package for the Social Sciences (IBM-SPSS®) version 20.0 for Windows.

**RESULTS**

*Socio-demographic and clinical profile*

The study participants were aged between 18 and 83 years, with the majority (38.8%) aged 40-59 years. Malays formed the majority (61.7%) followed by Indians (19.7%) and Chinese (18.2%). The majority of subjects (71.1%) were of lower educational background. More than three-quarters were married and with at least one child. As subjects were recruited from the outpatient clinics, majority of them have underlying co-morbidities such as diabetes and hypertension (Table I).

*Exploratory factor analysis and internal consistency reliability analysis*

The KMO test for sampling adequacy (0.947) and Bartlett's test of sphericity ( $p < 0.001$ ) indicated that the data was suitable for factorial analysis. A three-factor solution was necessary to replicate the English version of DASS-21. Based on communalities, eigenvalues and Scree plot, a three-factor structure was obtained using PCA of the 21 items. Following the orthogonal varimax rotation with Kaiser Normalization, factor loadings of the three constructs were examined.

In the rotated component matrix, most of the items were strongly loaded and clustered for each of the three factors; a few items displayed particularly high cross loadings across the three factors. A loading of at least 0.3<sup>15</sup> is desirable for each of the factor construct. Overall, the psychometric construct of the Malay-DASS-21 showed satisfactory conformity to the psychometric construct of the English version of DASS-21 (depression: item 3, 5, 10, 13, 16, 17, 21; anxiety: item 2, 4, 7, 9, 15, 19, 20; and stress: item 1, 6, 8, 11, 12, 14, 18). Eigenvalues and percentage of variance explained for the three factors were as follows: depression (9.710, 46.236), anxiety (1.074, 5.113), and stress (0.984, 4.686). Internal consistency reliability using Cronbach's alpha were as follows: depression (0.863), anxiety (0.850), stress (0.837), and overall (0.940) (Table II).

Table III shows the inter-correlation among the three domains and indicated that the anxiety and stress domain scores were highly correlated ( $r = 0.806$ ). The other domain scores were also highly inter-correlated.

There was excellent internal consistency reliability among the domains with values in the range of 0.837 to 0.863 and overall of 0.940 (Table IV).

**Table I Socio-demographic and clinical profile of 402 respondents**

Variable	No. of respondents	%
Age (yr)		
18-39	148	36.8
40-59	156	38.8
60-83	98	24.4
Ethnicity		
Malay	248	61.7
Chinese	73	18.2
Indian	79	19.7
Other	2	0.5
Religion		
Islam	251	62.4
Buddhism	73	18.2
Hinduism	78	19.4
Education		
Primary	47	11.7
Secondary	196	48.8
Tertiary	159	39.6
Nationality		
Malaysian	390	97.0
Non Malaysian	12	3.0
Marital status		
Married	315	78.4
Single	72	17.9
Widowed/Divorced	15	3.7
No. of children		
0	101	25.1
1	30	7.5
2	89	22.1
3	82	20.4
4	41	10.2
5	30	7.5
6 and above	29	7.2
Clinical profile		
Diabetes	50	12.4
Hypertension	54	13.4
Other Diseases*	78	19.4
Diabetes + Hypertension	74	18.4
Diabetes + Hypertension + Other Diseases	26	6.5
No illness	120	29.9

\*Other diseases include the following: bronchial asthma, hypercholesterolemia, arthritis, and allergies.

**Table II: Summary of exploratory factor analysis results using principal component analysis with varimax rotation for the Malay-DASS-21 (N=402)**

Item	Statement	Rotated factor loadings		
		Depression	Stress	Anxiety
1	I found it hard to wind down.	.364	.514	.256
6	I tended to over-react to situations.	.293	.548	.417
8	I felt that I was using a lot of nervous energy.	.035	.734	.367
11	I found myself getting agitated.	.383	.632	.243
12	I found it difficult to relax.	.433	.551	.219
14	I was intolerant of anything that kept me from getting on with what I was doing.	.291	.502	.418
18	I felt that I was rather touchy.	.284	.558	.201
2	I was aware of dryness of my mouth.	.051	.229	.740
4	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion).	.276	.378	.469
7	I experienced trembling (e.g., in the hands).	.345	.167	.588
9	I was worried about situations in which I might panic and make a fool of myself.	.291	.369	.529
15	I felt I was close to panic.	.345	.221	.660
19	I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat).	.282	.168	.680
20	I felt scared without any good reason.	.497	.102	.580
3	I couldn't seem to experience any positive feeling at all.	.707	.106	.361
5	I found it difficult to work up the initiative to do things.	.559	.358	.331
10	I felt that I had nothing to look forward to.	.601	.108	.428
13	I felt down-hearted and blue.	.636	.363	.202
16	I was unable to become enthusiastic about anything.	.567	.443	.280
17	I felt I wasn't worth much as a person.	.665	.266	.294
21	I felt that life was meaningless.	.769	.160	.206
Eigenvalue		9.710	1.074	0.984
% of variance		46.236	5.113	4.686
Cronbach's $\alpha$ (Overall: 0.940)		0.863	0.850	0.837

**Table III: Malay-DASS-21 domain inter-correlation and correlation matrix of the 21 items**

Domain	Domain intercorrelations		
	Depression	Anxiety	Stress
Depression	1.00		
Anxiety	0.795*	1.00	
Stress	0.805*	0.806*	1.00

\*The highest intercorrelation is boldfaced. P<0.01.

**Table IV: Correlation matrix of the 21 DASS items**

1	1.000																				
2	.363	1.000																			
3	.463	.436	1.000																		
4	.320	.437	.439	1.000																	
5	.461	.391	.514	.484	1.000																
6	.459	.408	.441	.428	.486	1.000															
7	.394	.302	.350	.519	.360	.409	1.000														
8	.388	.365	.339	.351	.470	.533	.437	1.000													
9	.399	.343	.412	.324	.453	.506	.370	.551	1.000												
10	.336	.316	.465	.400	.412	.451	.342	.363	.464	1.000											
11	.422	.316	.463	.446	.466	.437	.472	.395	.466	.542	1.000										
12	.511	.259	.399	.438	.475	.458	.450	.390	.434	.434	.685	1.000									
13	.465	.347	.396	.396	.397	.440	.459	.368	.462	.420	.602	.585	1.000								
14	.474	.370	.409	.367	.452	.542	.424	.483	.505	.401	.432	.444	.424	1.000							
15	.391	.377	.378	.418	.457	.443	.502	.507	.516	.390	.532	.476	.483	.500	1.000						
16	.461	.366	.428	.364	.541	.475	.447	.429	.456	.477	.567	.480	.520	.514	.616	1.000					
17	.413	.326	.449	.382	.452	.507	.380	.359	.430	.510	.427	.418	.499	.481	.493	.610	1.000				
18	.307	.335	.325	.359	.416	.390	.319	.428	.406	.282	.439	.474	.436	.402	.384	.410	.451	1.000			
19	.314	.304	.387	.492	.452	.398	.486	.467	.418	.366	.439	.432	.389	.405	.497	.509	.415	.468	1.000		
20	.418	.282	.364	.376	.433	.434	.463	.436	.464	.382	.456	.428	.488	.478	.529	.518	.568	.391	.508	1.000	
21	.361	.299	.384	.405	.450	.415	.424	.286	.407	.501	.481	.408	.506	.394	.358	.507	.595	.358	.388	.601	1.000

Table V: Reliability analysis (internal consistency) of the Malay-DASS-21 using Cronbach's alpha

Domain	Items	Cronbach's alpha
Depression	3, 5, 10, 13, 16, 17, 21	0.863
Anxiety	2, 4, 7, 9, 15, 19, 20	0.837
Stress	1, 6, 8, 11, 12, 14, 18	0.850
Overall	1-21	0.940

  

DASS-21: Depression				
Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
DASS 3	2.67	10.181	.580	.851
DASS 5	2.51	9.774	.612	.847
DASS 10	2.80	10.297	.612	.846
DASS 13	2.65	9.987	.600	.848
DASS 16	2.70	9.778	.691	.835
DASS 17	2.77	9.962	.695	.835
DASS 21	2.87	10.271	.653	.841

  

DASS-21: Anxiety				
Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
DASS 2	3.07	10.639	.462	.834
DASS 4	3.20	9.965	.597	.813
DASS 7	3.30	10.016	.613	.811
DASS 9	3.24	10.236	.555	.820
DASS 15	3.31	10.138	.665	.804
DASS 19	3.07	9.567	.630	.808
DASS 20	3.38	10.356	.609	.812

  

DASS-21: Stress				
Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
DASS 1	4.15	13.256	.570	.835
DASS 6	4.14	13.110	.644	.825
DASS 8	3.91	12.854	.590	.833
DASS 11	4.21	13.259	.639	.826
DASS 12	4.14	12.843	.674	.821
DASS 14	4.05	12.625	.630	.827
DASS 18	3.95	12.912	.545	.841

## DISCUSSION

Despite Malaysia being a multi-racial country comprising of various ethnicities practicing multiple languages, the Malay language remains the most widely spoken language of the country. Malay, being the national language of Malaysia, is taught and used in all schools across the country and thus, majority of the population has a better understanding of Malay than they do of English. As such, having a translated and validated Malay version of the DASS-21 would allow the use of a more effective screening tool to detect depression, anxiety and stress among majority of the Malaysian population.

Previous studies have been able to validate the Malay version of DASS-21 in various settings in Malaysia. One of the first few studies done in Malaysia included a case-control study in 2002 to determine the reliability of the DASS-21 in detecting depression, anxiety and stress among psychiatric patients as compared to healthy outpatient attendees. This study was able to show statistically significant results demonstrating the validity of the Malay version of DASS-21 as an effective screening tool among psychiatric patients in a hospital in Kuala Lumpur.<sup>16</sup> Following this, there have been numerous other studies by Ramli et al.,<sup>11</sup> also evaluating the validity and psychometric properties of the Malay version of DASS-21.

However, none of these studies were carried out to validate the questionnaire in an outpatient clinical setting. Therefore, our study was conducted to assess the psychometric properties of the Malay version of DASS-21 among male outpatient clinic attendees in Johor.

There were limited studies in Malaysia assessing the validity of the Malay version of DASS-21 among the male population. This is extremely vital in detecting these mental health disorders among men as they were at an increased risk of being depressed, anxious and stressed. A study conducted in Korea among white collar male workers revealed significant numbers of male workers suffering from depression, anxiety and stress.<sup>17</sup> Similarly, a cross-sectional study in Malaysia involving 728 male automotive assembly workers revealed that 35.4%, 47.2% and 31.1% of the males were suffering from depression, anxiety and stress, respectively.<sup>18</sup>

As illustrated in Table I, most of the outpatient clinic attendees in Segamat Hospital and Mahmoodiah Clinic were young to middle aged men aged from 18 to 59 years. The majority (38.8%) were 40 to 59 years, followed by 18 to 39 years (36.8%) and 60 to 83 years (24.4%). This is in keeping with the study by Ramli et al., that revealed a similar cohort of participants, with a majority aged between 18-39 years.<sup>11</sup>

Besides that, the study population consisted mainly of Malays who formed the majority (61.7%) and this was followed by Indians (19.7%) and Chinese (18.2%). It is to be noted that these sociodemographic factors, such as ethnicity, marital status and education status among the study population were not identified in previous studies. In addition, 70% of our study population suffered from other comorbidities such as diabetes, hypertension, and other diseases such as hypercholesterolemia or a combination of either of these diseases.

Overall, the psychometric construct of the Malay-DASS-21 showed satisfactory conformity to the psychometric construct of the English version of DASS-21 (depression: item 3, 5, 10, 13, 16, 17, 21; anxiety: item 2, 4, 7, 9, 15, 19, 20; and stress: item 1, 6, 8, 11, 12, 14, 18) (Table II). These findings were similar to those reported by Ramli et al.<sup>11</sup> It is to be noted that depression and stress demonstrated significant and distinct factor loadings individually with minimal cross loadings. In comparison between depression, anxiety and stress scales, depressive items generally had better factor loadings, Eigenvalue and percentage of variance as compared to the other domains. As per Table III, the highest inter-correlations remain for stress and anxiety with a value of 0.806 demonstrating significant overlap between the two domains.

Table IV illustrates the internal consistency reliability using Cronbach's alpha as follows: depression (0.863), anxiety (0.850), stress (0.837), and overall (0.940). The cut-off criterion was based on at least 0.7<sup>19</sup> for it to be reliable. As such, all domains were found to be reliable based on the Cronbach's alpha value and among all 3 domains, anxiety had the lowest value due to its poor factor loadings as demonstrated earlier. Internal consistencies found in this study (0.863, 0.850, 0.837) were higher than those reported by Ramli et al. that showed internal consistencies of 0.84, 0.74 and 0.79<sup>11</sup> and 0.75, 0.74 and 0.79,<sup>20</sup> respectively.

However, there were a number of limitations in this study that may restrict its generalisability. Firstly, it involved a rather small sample size of 402 male clinic outpatients in two major outpatient clinics in the state of Johor which did not provide an overall picture of all outpatient clinic attendees in the entire state (estimated population of 3.35 million as of 2010).<sup>21</sup> Secondly, there was no test-retest carried out and hence, we were unable to verify the stability of the questionnaire across time. In addition, there was no discriminant validity analysis performed using the Fifth Diagnostic Statistical Manual of Mental Disorder (DSM- V)<sup>22</sup> as a "gold-standard" to validate the use of DASS-21 among male outpatient clinic attendees.

## CONCLUSIONS

The present study showed that the Malay-DASS-21 is a highly valid and reliable instrument to measure self-perceived depression, anxiety, and stress among male outpatient clinic attendees in Johor. Further studies are necessary to revalidate the factor structure of the Malay-DASS-21 across different populations and cultures, and using confirmatory factor analyses.

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