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CROSS-CULTURAL ADAPTATION AND VALIDATION OF THE DEPRESSION ANXIETY STRESS SCALE—21 IN NON-NATIVE ENGLISH SPEAKING PARTICIPANTS IN BRUNEI.

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ABSTRACT

Introduction: The English version of the Depression Anxiety Stress Scales - 21 (DASS-21) lacks assessment of comprehensibility and validity when used in Asian populations whose first language is not English. This study aims to evaluate comprehensibility, validity, and reliability of the English version of DASS-21 among non - native English speaking university students in Brunei. **Methods:** The study comprises three stages. First Comprehensibility of the English DASS-21 was tested in 15 university students in Brunei who were studying in English. English and Malay synonyms were added in parentheses following those DASS-21 English words that were unfamiliar to the participants. Next, reliability and temporal stability of the adapted DASS-21 were tested with 39 participants selected by purposive sampling. Reliability statistics, factor analysis, and convergent / divergent validity were tested with 204 university students. **Results:** The adapted English DASS-21 in the Brunei context, demonstrated good Cronbach's alpha (ranges of alphas = 0.70 - 0.78), good temporal stability and convergent/discriminant validity. Three factors were detected, however, most of the stress items split between anxiety and depression construct. **Conclusion:** The triangulation of data from interscale correlations and convergent/discriminant validity indicated that the three scales of the adapted English version of DASS-21 contain variance that is specific to each scale. However, the stress scale should be used with caution when used for outcome assessment. We recommend cross-cultural adaptation of the English version of DASS-21 before its use in Asians countries, where English is not a first language.

Keywords: Asia, Anxiety, Depression, Patient health questionnaire (DASS-21), Reproducibility of results, Validation study.

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INTRODUCTION

Depression Anxiety and Stress Scale (DASS-21) is a well-established instrument in the

western world that measures depression, anxiety and stress among adults.¹ It has been shown that this self-reported questionnaire has three – factor structure and good psychometric properties.² The measure has been translated and validated in many languages including Malay³, Vietnamese⁴, Italian⁵, Nepal⁶, Sri Lanka, Indonesia, Taiwan and Thailand,

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Singapore¹, showing high internal consistency, and inconsistent one-, two-, three- and four- factor structure.

Besides the translated version, some studies carried out in Asia have used the original English version of the DASS-21.^{1,7-9} It has been suggested that cultural context or the interpretation of words by non-native speakers may limit the tool's validity and reliability.¹ Hence, cross-cultural adaptation or modification of a measure developed in English-speaking countries is recommended before its use in a different culture and country.^{10, 11} To date there has been no research examining comprehensibility, temporal stability, convergent and discriminant validity of the English version of DASS-21 among Asian populations.

Hence, the aim of the present study was to examine the comprehensibility, validity and reliability of the English version of DASS-21 scales with a larger group of university students in Brunei whose first language was not English.¹² The specific aim was to examine the scales' temporal stability, convergent and discriminant validity. Convergent validity was assessed by comparing the DASS-21 to the Perceived Stress Scale -10 (PSS10). Discriminant validity was assessed by comparing the scale to the Life Orientation Test Revised (LOT-R) that measures level of optimism. We hypothesized that the DASS-21 factor scores would show positive correlation with the PSS and inverse correlations with LOT - R scale scores.

MATERIALS AND METHODS

Study Design and Participants

The current study comprised three stages: stage I: pretesting the English version of the DASS-21 questionnaire for comprehensibility (including assessment of semantic-idiomatic expressions, cultural equivalences) in 15 participants¹³; stage II (pilot study): assessment of reliability of the adapted English version of

DASS-21, using the criterion of stability (test-retest) in 39 participants, and stage III: reliability and construct validity evaluation of the adapted DASS-21 in 204 participants.¹⁴ The study was conducted at the Pengiran Anak Puteri Rashidah Sa'adatul Bolkiah Institute of Health Science (PAPRSB IHS). Pretesting and the pilot study were carried out from September to October 2014, whereas the third stage was conducted from July to September 2015. All participants completed the DASS-21, PSS10, and the LOT-R.

Depression Anxiety Stress Scale -21

The Depression Anxiety Stress Scales (DASS-21) is a short version of the original 42-item DASS that measures depression, anxiety and stress in clinical or non-clinical settings "over the past week"; DASS-21 comprises of Depression, Anxiety and Stress Scale, seven items each.¹⁵ DASS-21 is suggested to be better than most measures of anxiety and depression (Supplementary text).¹⁶

The Perceived Stress Scale (PSS)

The Perceived Stress Scale (PSS) is the most used self-report measure of how much life situations are appraised as stressful and unpredictable.¹⁷ PSS10 total scores are obtained by reversing the scores of the four positive items (e.g. Items 4, 5, 7 and 8) and then summing all the PSS10 (Supplementary text). The instrument has shown to be highly reliable.¹⁸

The Life Orientation Test-Revised (LOT-R)

The Revised Life Orientation Test (LOT-R)¹⁹ is a self-report measure comprising 10 items that measure dispositional optimism on a 5-point scale (Supplementary text). Of the 10 items six are scored, and four are filler items not used in the scoring. Three of the six items are positively worded and three are negatively worded items. Optimism is defined as generalized positive outcome expectancy²⁰ and may predict aspects of depression.²¹

Study Procedures

Stage I: Pretesting for comprehensibility

Consecutive pretesting, over a period of three weeks were conducted to explore the comprehensibility of the English version of the DASS-21 with 15 university students. The aim was to assess the linguistic clarity, word phrases/idiomatic expressions, and cultural equivalences of the English Version of DASS-21¹², PSS10 and LOT-R. Age of participants ranged from 17 to 26 years (mean = 20.4, SD = 2.1). Initial pretesting were carried out on all instruments with five students.¹¹ Students were asked to indicate whether the phrasing of questions was clear.²² Participants' comments related to the instruments' comprehensibility were recorded with previous consent. Any phrases or words which were not clear or were ambiguous were amended according to participants suggestions and pretested with further 5 students until no further issues were brought up. A total of 3 consecutive pretests were carried out in a total of 15 students.

Stage II: Pilot study for testing internal consistency reliability and test-retest reliability

Following the pretest, a convenience sample of thirty-nine students volunteered to participate in the pilot study for testing the psychometric properties of the adapted version of the DASS-21, with modifications to Stress items 1, 11 and 18 and to Depression item 13, and PSS10 and LOT-R.

Stage III: Factor structure, convergent and discriminant validation of the adapted DASS - 21

Ten months after the pilot study, the adapted DASS-21 was tested for validity and reliability in 204 students (74% females and (26% males). All students at PAPRSB IHS (around n=350) were approached via faculty e-mail and face-to-face contact, and were briefed about the study's goals and procedures.

Ethical approval

Ethics approval for the conduct of the study was given by the Research Ethics Committee of PAPRSB IHS, Universiti Brunei Darussalam (UBD). Participation was voluntary and not compensated. Where necessary, convenience, comfort and privacy were provided to all participants.

Statistical Analysis

Data from the pretest were assessed qualitatively. The reliability of questionnaires was analyzed with CITCs, Cronbach's alpha and test-retest reliability using single measures.¹³ Cronbach's alpha with a cut-off of 0.7, and corrected item - total correlation of above 0.20 were considered adequate.^{13,14,23} Further, principal component analysis (PCA) with varimax rotation was carried out to examine the construct validity of the adapted DASS-21. A coefficient level of ≥ 0.30 was considered significant for item factor loadings.⁴ Pearson's correlations coefficients were also calculated between each adapted DASS-21 subscale, PSS10 and LOT-R. Statistical analyses was performed using IBM S/SPSS Version 21.

RESULTS

Stage I: Pretesting

Overall, 15 students, 12 (80%) female and 3 (20%) male, participated in the 3 consecutive pretests (five students in each pretest). The majority of participants were Brunei Malays (60%), Brunei Chinese (20%), Brunei Iban (6.7%), Pakistani (6.7%), Moldavian (6.7%) and Indian (6.7%). Age ranged from 17 to 26 years (mean = 20.4, SD = 2.1).

During the first pretest, it was found that the students were not familiar with the words/phrases "wind down" in Stress's scale item 1, and "agitated" in Stress's scale item 11 of the DASS-21. Following the pretest, a Malay word (*sukar ditenteramkan*) and English synonym (calm down) were added in pa-

rentheses following the English phrase in item 1: "I found it hard to wind down (calm down, *sukar ditenteramkan*"); "*Sukar ditenteramkan*" is a Malay translation of "wind down" and was used in a previously validated Malay version of the DASS-21.³ Additionally, the synonym "upset" was added in parentheses following the English word "agitated" in Stress's scale item 11: "I found myself getting agitated (upset)."

The adapted DASS-21, PSS10 and LOT-R were then pretested for the second time with five other students; this time a few students were not familiar with the word "blue", the item 13 in the Depression scale, and the word "touchy", item 18, in the Stress scale. The English synonyms "sad" and "irritable, oversensitive" were added in parentheses next to the English word "blue" in item 13: "I felt down-hearted and blue (sad)" and the word "touchy" in item 18: "I felt that I was rather touchy (irritable, oversensitive)". The adapted DASS-21 instrument was pretested for the third time with five more students and no new issues were found.

Stage II: Pilot study

Thirty nine individuals, 14 male (35.9%) and 25 female (64.1 %) participated in the pilot study. Participants were aged between 17 and 26 years (mean = 20.5, SD = 2.1). The majority of participants were Brunei Malays (59.0%), Brunei Chinese (35.9%), Iban (2.6%) and others 2.6%). Reliability coefficients using single measures of intraclass correlations revealed favorable 1-week test – retest stability for the adapted DASS - 21

(range of $r_s = 0.64 - 0.68$), the PSS -10 ($r = 0.65, n = 39$), and the LOT - R ($r = 0.62, n = 39$). Cronbach's alpha of the adapted DASS - 21 ($n = 39$) (Depression $\alpha = 0.82$, Anxiety $\alpha = 0.80$, Stress = 0.89), PSS -10 ($\alpha = 0.74, n = 39$), and LOT - R ($\alpha = 0.56, n = 39$).

Stage III: Summary statistics, Reliability and Validity

The mean age of the participants in the third stage was 20.4 years (SD 3.8), 53 male (26%) and 151 female participants (74%). The majority were Malay (73.5%), followed by Chinese (17.6%) and other ethnic groups (9.0%). Cronbach's Alpha values for Depression, Anxiety, and Stress were 0.78, 0.70, and 0.78, respectively. As shown in Table 1, the Cronbach's alpha for PSS10 ($\alpha = 0.70$) and the LOT - R were satisfactory ($\alpha = 0.46$). The correlation between the Stress and Depression was 0.64; between Stress and Anxiety was 0.66, and between the Depression and Anxiety it was 0.43 (Table I).

Factor analysis

Principal component analysis (PCA) with three factors specified¹⁵ accounted for 46.9 % of the item variance. Table 2 shows factor loadings for the adapted DASS-21 items. Overall, all item loadings were high and significant. The first factor that emerged consisted of six depression items (the range of the factor loadings after varimax rotation was 0.480–0.732) and four stress items (item 11, 12, 14 and 18). The second factor that emerged consisted of six anxiety items (the range of the factor loadings after varimax rotation was 0.544–0.777) plus two stress items (items 6

Table I: Reliability coefficients (in parentheses), interscale correlations, and correlations with measures of PSS and LOT-R ($n = 204$).

	DASS-D	DASS-A	DASS-S	PSS	LOT-R
DASS Depression	(0.78)			0.49**	0.36**
DASS Anxiety	0.43**	(0.70)		0.38**	- 0.05
DASS Stress	0.64**	0.66**	(0.78)	0.49**	- 0.2

DASS = Depression, Anxiety, Stress. (D=Depression, A=Anxiety, S=Stress)
PSS=Perceived Stress Scale; LOT-R = Life Orientation Test-Revised;
**Correlation is significant at 0.001 level (2-tailed)

Table II: Factor loadings for adapted DASS-21 and CITC (n=204).

Subscale Item	Factor Loadings			
	F1 ^a	F2 ^a	F3 ^a	CITC
DEPRESSION				
3. I couldn't seem to experience any positive feeling at all	0.480			0.475
5. I found it difficult to work up the initiative to do things			0.743	0.369
10. I felt that I had nothing to look forward to	0.510			0.523
13. I felt down-hearted and blue (sad)	0.708			0.562
16. I was unable to become enthusiastic about anything	0.612			0.517
17. I felt I wasn't worth much as a person	0.723			0.596
21. I felt that life was meaningless	0.732			0.504
ANXIETY				
2. I was aware of dryness in my mouth			0.586	0.226
4. I experienced breathing difficulties (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)		0.484		0.353
7. I experienced trembling (e.g., in the hands)		0.571		0.482
9. I was worried about situations in which I might panic and make a fool of myself		0.566		0.455
15. I felt I was close to panic		0.679		0.524
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)		0.608		0.469
20. I felt scared without any good reason		0.628		0.435
STRESS				
1. I found it hard to wind down (calm down, sukar ditenteramkan)			0.514	0.475
6. I tended to over-react to situations		0.451		0.369
8. I felt I was using a lot of nervous energy (an extra energy that you have when you are worried)		0.773		0.523
11. I found myself getting agitated (upset)	0.712			0.562
12. I found it difficult to relax	0.510			0.517
14. I was intolerant of anything that kept me from getting on with what I was doing	0.420			0.596
18. I felt that I was rather touchy (irritable, oversensitive)	0.471			0.504

^aData extraction using principal component analyses and Varimax rotation. F1=Factor 1, F2=Factor 2, F3=Factor 3. Factor loadings below <0.4 are not included. CITC = corrected item-total correlation.

and 8). Finally, the third factor that emerged consisted of three items: Item 5 (0.743), item 2 (0.586), and item 1 (0.514) (Table II).

Convergent and Divergent Validation

Correlations between the adapted DASS-21 and PSS scores are presented in Table 1. The correlations between stress and PSS and depression and PSS were ($r_s = 0.49, p < 0.01$), and between anxiety and PSS -10 was ($r_s = 0.38, p < 0.01$). To further underline the divergent validity of the adapted DASS-21, the scale was compared with a measure of LOT-R (Table 1). As hypothesized, the magnitude of divergent validity of the adapted DASS-21, the scale was compared with a measure of LOT-R (Table 1). As hypothesized, the magnitude of

correlations between depression and optimism ($r = -0.36, p < 0.01$) was higher than the correlations between anxiety and optimism ($r = -0.05$) and stress and optimism ($r = -0.20$).

DISCUSSION

This article makes several major contributions towards understanding the use of the English version of DASS-21 in the Asian populations. First, to our best knowledge, we tested for the first time the comprehensibility of the English DASS-21 in large Asian sample whose first language is not English. Results showed that several words and expressions in the English DASS-21 Stress scale were difficult to under-

stand by study participants which is in line with previous studies using the English and the translated Malay version of DASS-21.^{1,3,7} By adding English and Malay synonyms in parentheses next to the problematic words, we ensured the comprehensibility of the items.¹³

Cross loadings of the Stress items with the Depression subscale may indicate that the depressed subjects also experience a degree of stress.^{6, 24} Furthermore, the observed overlap between the DASS-Stress and DASS-Anxiety items may be due to the natural concordance between the syndromes assessed by the Anxiety and Stress scales or due to cultural perceptions and interpretation of some stress items in Asian samples.^{1,15} Item 5 of the DASS-21 depression factor was loaded in the DASS-Stress scale. Similar results for item 5 have been reported previously for the English version of DASS -21²⁴, and for the DASS-21 translated in six Asian countries.¹ Olei *et al*²⁵ suggested deletion or revision of item 5, however, removal of an item may not necessarily be the best solution.⁵ Consistent with other studies¹³ a CITC above 0.20 for each item shows that each item measures the same underlying construct.¹³

Second, as expected, the adapted DASS-21 scales were strongly correlated with the PSS10 scores, indicating good convergent validity, and suggesting that people who score high on the PSS are at risk for future distress.¹⁷ Further, it has been suggested that positive affect contrary to negative affect is consistently negatively related to symptoms of depression.²⁶ In line with this, the current study found that LOT-R was related more strongly to depression than to symptoms of anxiety, indicating that the depression scale represents a rather specific construct.²⁷

Third, it was found that the adopted DASS-21 is fairly stable across time and comparable with the original English DASS-21

version.^{5, 28} This is important because studies that have measured temporal stability of the English DASS-21 in the past are few, and up to date no studies have reported the temporal stability of DASS-21 in Asian populations. Further, the adapted DASS-21 demonstrated excellent internal consistency reliability.¹⁵ There are some limitations to this study. Participants in this study were from single university. This may restrict the generalizability of the study findings. In addition, study results cannot be generalized for individuals without university degree in Brunei.

CONCLUSION

The present study recommends that the English version of the DASS - 21 be pretested for comprehensibility before its use in Bruneian or Asian populations. The triangulation of data from interscale correlations, temporal stability, and convergent/discriminant validity indicates that the adapted DASS-21 scales in Brunei contain variance that is specific to each subscale²⁴, and is psychometrically valid tool for use in Brunei, especially for assessment of Depression and Anxiety. The stress subscale should be used with caution when used for outcome assessment.

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DECLARATION OF CONFLICTING INTERESTS

The Authors declare no conflict of interest.

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