Retraction announcement about the article "The factor structure of the Thai version of the Depression Anxiety and Stress Scales (Thai DASS-42) and its application in a community sample of Thai women living in Sydney, Australia"

This article has been retracted at the request of the authors. The Publisher and the authors would like to apologize for any inconvenience caused.

ORIGINAL RESEARCH

The factor structure of the Thai version of the Depression Anxiety and Stress Scales (Thai DASS-42) and its application in a community sample of Thai women living in Sydney, Australia

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Abstract

Background: Cultural awareness and its implications in assessment is becoming an important issue in mental health. Recent studies examining this issue have found that the psychometric properties of some commonly used assessment instruments may vary considerably, especially when administered to people who have English as a second language.

Objective: To examine the factor structure of the Thai Depression Anxiety and Stress Scales (DASS-42) using internal consistency and confirmatory factor analysis.

Methods: The Thai DASS-42 was administered to a non-clinical sample of Thai women (N = 300) residing in various metropolitan areas of Sydney. The findings were compared with the data of a Thai-speaking sample (N = 502) in Bangkok for validation compared with the English version by Lovibond and Lovibond.

Results: Confirmatory factor analysis showed that the Thai DASS-42 discriminates between depression, anxiety and stress, but the extent of differentiation between these negative emotional disorders was less in comparison with the English DASS. Moreover, the Thai DASS-42 showed less discrimination between the three scales in an Australian Thai-speaking sample in comparison with a normal Thai-speaking sample in Bangkok (N = 502). In general, the factor loadings for all 42 DASS items in the Australian Thai-speaking sample were comparable with those in both the English-speaking and the Bangkok samples, and indicated that the items had been adequately and appropriately translated and adapted. The Thai DASS-42 demonstrated significant means and standard deviations (SD) 5.02 (7.37), 5.01 (6.51) and 7.52 (8.63) respectively for depression, anxiety and stress subscales with significant factor loading values.

Conclusions: The Thai DASS-42 was found to have sound psychometric properties and to be a suitable tool for use among Thai women living in Sydney. The present findings will help guide further preventative research in examining indications of subclinical anxiety and depression.

Key words

1 Introduction

The number of Thai immigrants, particularly females, living in Australia is increasing, yet there is little available information related to their health needs or, more specifically, their mental health status following settlement in a new country. Jirowong and Manderson [1] examined the health needs of Thai women living in Brisbane, Australia, and found that mental health issues were emerging as a significant problem for these women. Awareness of cultural differences across ethnic groups has implications in assessment and is emerging as an important issue in mental health [2-4].

1.1 Aims of the study

The aims of the study were to:

- Develop and test Thai Depression, Anxiety and Stress Scales (DASS-42);

- Examine the factor structure of the Thai DASS-42 using internal consistency and confirmatory factor analysis.

1.2 Background of the study

Early studies examining this issue have found that the psychometric properties of some commonly used assessment instruments, such as the Anxiety Sensitivity Index (ASI) [5], have been extensively evaluated across different ethnic groups [6-8]. These reports have highlighted that the psychometric characteristics of the ASI do vary considerably across groups. Therefore, more commonly used assessment instruments need to be evaluated using various ethnic groups.

Two other measures widely used in clinical and research settings are the Beck Anxiety Inventory (BAI) [9] and the Beck Depression Inventory-II (BDI) [10]. The BAI and BDI are easy to administer and are extremely sensitive measures of anxiety and depression [11]. One criticism of these instruments is that, although they are effective measures, they do not address a third state (termed stress) that is common to depression and anxiety. In response to this criticism, a stress scale that could be distinguished from depression and anxiety was developed. The Depression, Anxiety and Stress (DASS) is now commonly used and provides measures that highly differentiate between these three disorders [12]. The DASS has received increased attention in general clinical use, among community samples [12-14] and in treatment outcomes research [15-17]. This situation raises a question about the external validity of the findings of these studies. Thus, the present study focused on the question of whether the previous findings pertaining to the reliability and validity as well as the simple factor structure of DASS can be generalized to participants for whom English is a second and sometimes third language.

The DASS is written in English and is a self-report questionnaire, designed to assess the unique features common to depression, anxiety and stress. Two versions of the DASS are offered: a 42-item version and a 21-item version consisting of a subset of items from the 42-item version. The DASS comprises three scales, depression, anxiety and stress, and each scale consists of either 14 or 7 items, depending on the version used. There needs to be some concern about questionnaires such as the DASS that are written in English, especially when they are administered to people who have English as a second language. The major reservation is that the full subtlety of meaning behind individual statements or words may be lost or misinterpreted, for example, statements from the DASS-42 such as "I found it hard to wind down" and "I felt that I was using a lot of nervous energy" are not common expressions used by Thai people. When English versions are used, the outcome may result in people being missed or wrongly diagnosed. This suggests that, if the DASS is the appropriate questionnaire to use, it needs to be accurately and sensitively translated into the language of the group being studied. The psychometric properties of these measures also need to be evaluated to ensure consistency and reliability with the original document.

When the DASS has been translated into different languages, for example, Spanish [18] and Chinese [19], the results suggested good internal consistency and construct as well as divergent validity. At present, there is no DASS available in the Thai language that could be used to gauge the levels of depression, anxiety and stress among Thai women who have

recently immigrated to Sydney. The aim of this study was to develop and test a Thai version of the DASS-42 (Thai DASS-42) in a group of community-based Thai women in Sydney and to evaluate the efficacy and validity of the Thai DASS-42 in identifying the emotional state of this Thai group.

In this study women were identified as a group more at risk of mental health issues therefore, the comparison samples were women. This is to ensure no other variables were introduced and to enable comparison across groups.

1.3 Implications for practice

- The adapted and validated Thai DASS-42 version will provide clinicians with an appropriate assessment tool for use in counselling and treatment.

- The symptom domains that can be measured by using the Thai DASS-42 version can guide clinicians more accurately in diagnosis.

- A more culturally appropriate DASS-42 has been developed for the Thai population.

2 Methods

2.1 Participants

A sample of 300 Thai women living in the Sydney metropolitan area was invited to participate in the study. Following ethics approval, recruitment and data collection was carried out via advertisements in two Thai newspapers and news leaflets distributed at four Thai temples in Sydney, and through activities organized by the Thai Welfare Association. Participants were recruited after they had contacted the researchers, were willing to be included in the study and had satisfied the inclusion criteria. The participant inclusion criteria were (1) aged between 18 to 65 years, (2) living within the Sydney community and (3) able to write and read Thai.

2.2 Development of the Thai version of DASS-42

Special permission from the original author of the DASS [12] was obtained prior to the commencement of this study. The process of translation and pilot testing was conducted in accordance with established guidelines outlined by Brislin [20]. This process ensured there was congruence in meaning between the original and translated versions of the DASS.

The first step in translation involved three English language teachers (all native Thai speakers) working independently from one another to translate the DASS-42. This step resulted in three different versions, which were later merged following consensus to produce one Thai version. The second step was to give this Thai version to a further three independent credited translators (all native Thai speakers), who were all fluent in English, and unaware of the existence of the original questionnaire. These translators were asked to translate the Thai version back into English. Similarly, these three new versions after consensus were merged into one document. The result was an English version that had been translated from the Thai version. This English version was developed to improve the cultural equivalence of the instrument so that it did not merely produce simple word-for-word equivalence [21].

The final step in the translation process involved pilot testing the English version with a group of nine Thai undergraduate university students, each of whom was bilingual. They were asked to review the instrument and identify any statements or words that were not easily understood. Changes were made only when there was consensus among the students and the first author that indicated a better phrase or word needed to be selected. This new English version proved to be grammatically and semantically equivalent; thus, the final translated version in the Thai language DASS-42 (Thai DASS-42) was accepted.

The structure of the Thai DASS-42 was the same as the original English version of the DASS-42 [12]. For each of the three scales (depression, anxiety, stress), participants were asked to respond to each of the seven items on a 4-point combined severity/frequency scale to rate the extent to which they had experienced each item over the past week. The scale ranges from 0 = did not apply to me at all to 3 = applied to me very much, or most of the time. Scores for the depression, anxiety and stress scales were calculated by summing the scores for the relevant items and multiplying by two.

2.3 Procedure

The Thai DASS-42 was mailed to the Thai women who had consented to participate in this study. The nature and purpose of the study was explained to all participants when they first contacted the researcher. A self-addressed, stamped envelope was provided for easy return to the researcher. Completion of the returned survey was considered their consent to participate.

2.4 Data analysis

Three hundred (N = 300) Thai women completed and returned the survey. The approach used to test the Thai DASS-42 factor structure was confirmatory factor analysis. To examine the construct validity of the DASS-42, exploratory factor analysis was performed first. A principal component extraction was used, after which the number of factors was determined by both eigenvalues (>1) and the scree test [22, 23]. These criteria suggested a three-factor solution (eigenvalues = 13.365, 2.088 and 1.698), accounting for 40.84 % of the variance. Previous research and theory suggest that the three scales, and the constructs they are designed to measure, are correlated [12]. The obtained absolute correlations among factors were statistically significant ($p<.0001$) and similar to previous studies [12]; depression and anxiety factors correlated at .61 and .75, depression and stress correlated at .61 and .77, and anxiety and stress correlated at .67 and .81. These correlations suggested an oblimin rotation. However, to have an easy to understand factor structure, a varimax rotation was employed to the initial solution. To evaluate the factor structure of the Thai DASS-42, exploratory factor analysis with principal component extraction was performed on the same Thai-Bangkok sample (n = 502) and Australian-Thai sample (N = 300). Like the DASS-42 [12] analysis, varimax rotation was used to examine the factor structure of the scale. Both the eigenvalues greater than one and scree plot suggested a three-factor solution (eigenvalues 6.599, 1.492 and 1.136), accounting for 43.94 % of the variance. The coefficients, which assess the strength of the links between the three factors, were depression-anxiety 0.91, anxiety-stress 0.89 and depression-stress 0.93. These comparisons indicate that distinguishing between depression and the other two scales yields a significant distinction between anxiety and stress.

3 Results

To provide a reference point for evaluating the adequacy of the distinction between the three DASS scales, the Thai sample was compared with the data used by Lovibond and Lovibond [21] derived from the English version of the DASS (N = 720), and a correlational (Pearson's) analysis of convergent and discriminant validity was conducted by correlating each DASS item with its own DASS subscale and with other DASS subscales. The three-factor demonstrated a pattern similar to the Thai results. Thus, in both the Thai and the English cases, the three-factor solution produced significantly better result subscales.

The data of Bangkok Thai (N = 502) were also analyzed in comparison with Australian Thai (N = 300). The psychometric properties of the DASS scales for the 42 items were evaluated using confirmatory factor analysis based on the covariance matrix for comparison purposes. Internal consistency reliability coefficients for DASS-42 depression, anxiety, stress subscales and the full scale were found to be high, with Cronbach's alphas of .89, .85, .81 and .95 respectively (see Table 1), demonstrating a pattern similar to the results of both the Australian Thai-speaking and Bangkok Thai-speaking samples. Overall, feedback by a Thai clinician regarding the quality of the translation, including its clarity, comprehensibility and acceptability, was positive (see Table 1) for the Australian Thai-speaking and Bangkok Thai-speaking samples, comparing with the English samples [12] separately.

Table 1. Item summaries with factor loadings from three-factor confirmatory analysis for the Australian-Thai (N = 300), English (N = 720) and Bangkok-Thai (N = 502) samples

Scale	Australian-Thai Factor loadings 1/2/3	English Factor loadings 1/2/3	Bangkok-Thai Factor loadings 1/2/3
Depression			
couldn't experience positive [Q3]	0.80	0.76	0.61
difficult work up initiative [Q5]	0.56	0.47	0.58
nothing look forward [Q10]	0.79	0.73	0.61
downhearted and blue [Q13]	0.85	0.62	0.78
lost interest in everything [Q16]	0.65	0.70	0.58
not worth much as person [Q17]	0.51	0.69	0.60
life not worthwhile [Q21]	0.69	0.68	0.68
felt worthless [Q34]	0.53	0.64	0.73
difficult to work up initiative [Q 42]	0.58	0.53	0.49
Anxiety			
dryness of mouth [Q2]	0.48	0.43	0.30
breathing difficulty [Q4]	0.55	0.40	0.41
trembling [Q7]	0.46	0.58	0.58
worried situations panic [Q9]	0.65	0.56	0.56
close to panic [Q15]	0.75	0.66	0.75
aware action heart [Q19]	0.59	0.47	0.46
scared no good reason [Q20]	0.78	0.57	0.68
worried about situations/panic [Q 40]	0.41	0.53	0.53
trembling [Q41]	0.49	0.62	0.50
Stress			
hard to wind down [Q1]	0.71	0.53	0.68
over-react to situations [Q6]	0.63	0.53	0.56
difficult to relax [Q8]	0.75	0.64	0.48
getting agitated [Q11]	0.87	0.64	0.70
using nervous energy [Q12]	0.83	0.70	0.64
impatient when delayed [Q14]	0.58	0.51	0.49
rather touchy [Q18]	0.58	0.63	0.57
agitated [Q 39]	0.41	0.72	0.59
difficulty tolerating interruption [Q 32]	0.62	0.65	0.58

The factor loadings for DASS-42 items. A factor loading of .40 or greater was considered significant ($p < .01$, two-tailed). The range of factor loadings (after varimax rotation) was .410 to .739. Among anxiety items, four loaded on the anxiety factor, five on the stress factor and four on the depression factor only. One of the anxiety items loaded on both the depression and the anxiety factors, but was higher on the anxiety factor. These factor loadings were .402 to .676. Seven items from the stress scale loaded significantly on the corresponding stress factor and five of these items loaded on anxiety only.

Means and standard deviations (SD) for the three DASS scales (42 items) are provided in Table 2. The differences in means between the Australian-Thai and English samples indicated that, for the depression and stress scales, the Australian-Thai mean was significantly lower than the English mean, whereas there was no significant difference between the two samples for the anxiety scale. The differences in means between the Australian-Thai and Bangkok-Thai samples indicated that, for the anxiety and stress scales, the Australian-Thai mean was significantly lower than the Bangkok-Thai mean, whereas there was no significant difference between the two samples for the depression scale. However, the differences in means between the English and Bangkok-Thai samples indicated that the depression scale was significantly lower on the anxiety scale, and that there was no significant difference in comparison with the Bangkok-Thai sample.

Consistencies of convergent validity between the two scales are shown in Table 3 for each sample separately. Consistent with the factor analysis, the intercorrelations were higher in the Australian-Thai sample (see Tables 4 and 5).

Table 2. Mean depression, anxiety, stress scores and standard deviations for Bangkok Thai (N = 300)*, Bangkok-Thai (N = 502)* compared with English (N = 720) [12] samples

	Australian-Thai		Bangkok-Thai		English		t	p
	M	SD	M	SD	M	SD		
DASS Depression	5.02	7.3	5.35	6.47	7.32	7.11	0.89	.375
DASS Anxiety	5.01	6.99	6.54	5.72	5.23	5.61	3.22	.001
DASS Stress	7.52	8.63	11.17	7.07	10.54	7.36	3.17	.002

Table 3. Internal consistency and convergent validity of Thai DASS-42 and Bangkok-Thai DASS-42

Australian Thai		Bangkok Thai	
Coefficient	Item total	Coefficient	Item total
alpha	correlation	alpha	correlation
.88	.45–.60	.74	.44–.57
.85	.35–.61	.70	.34–.48
.86	.42–.61	.76	.41–.57
.95	.38–.65	.89	.33–.62

Table 4. Intercorrelations among subscales for the Australian-Thai (N = 300), English (N = 720), and Bangkok-Thai (N = 502) samples Correlations among DASS Subscales

	Australian-Thai		English		Bangkok-Thai	
	Depression	Anxiety	Depression	Anxiety	Depression	Anxiety
Anxiety	0.74	– –	0.46	– –	0.61	– –
Stress	0.76	0.78	0.49	0.55	0.63	0.67

Table 5. Intercorrelations among subscales for the Australian-Thai (N = 300), English (N = 720) and Bangkok-Thai (N = 502) samples Correlations among DASS Subscales

	Depression	Anxiety	Stress
Depression	–	.61*	.61*
Anxiety	.75*	–	.67*
Stress			
Full Scale .95 .38–.65 .89 .33–.62	.77*	.81*	–

Note. Upper diagonal represents correlations among Thai DASS-42 subscales. Lower diagonal represents correlations among Bangkok DASS-42 subscales. *All correlations are significant at the 0.0001 level (2-tailed).

4 Discussion

With regard to the internal consistency measures of the DASS, the current results are in line with the previous research findings. The internal consistency measures of both Thai versions of the DASS were similar to past findings [12]. Subscales of both of the versions correlated with each other significantly. Currently, well-established and empirically validated instruments that reflect Thai cultural for the proper assessment and evaluation of the levels of depression, anxiety or stress

are virtually non-existent. This study modified and adapted a Thai version of the DASS-42 that consisted of translations of the original 42 items.

The factor structure of the 42-item Thai DASS was tested with confirmatory factor analysis, which indicated that the three scales provided a better fit [12] to the data than either a one-factor or a two-factor solution. The results also demonstrated that, although the Thai DASS-42 significantly discriminates between the negative emotional disorders of depression, anxiety and stress, there is less differentiation between the scales in comparison with the English DASS-42. Moreover, the Thai DASS-42 showed less discrimination between the three scales in an Australian Thai-speaking sample in comparison with a normal Bangkok-Thai sample, as measured by a similar version of the questionnaire.

The validity coefficients are lower than those reported in previous studies [24]. The method used in the current study may partly explain this [24]. In the present study, traditional methods of establishing convergent and discriminant validity were not used. Internal consistency reliability coefficients for DASS-42 depression, anxiety and stress subscales and full scale were found to be high, with Cronbach's alphas of .89, .85, .81 and .95 respectively (see Table 4 and 5).

The moderate-to-high factor loadings for the Thai translations of the 42 items indicate that the items are tapping into the constructs under study and have therefore been translated adequately. They also indicate that the content of these items has meaning and is acceptable within the Thai-speaking population, which is consistent with the positive feedback received from participants and the Thai-speaking community regarding the quality of the translation. In addition, the factor loadings are generally comparable with those of the English sample and the Thai-Bangkok normal sample. Taken together, these results suggest that the poorer discrimination between the Thai DASS-42 scales in the Australian Thai-speaking sample, relative to the English and Bangkok normal samples, is more likely to be due to factors in this particular Thai-speaking sample and/or the Australian Thai-speaking population and not the quality of the translation itself.

This is inconsistent with evidence that suggests that, in the majority of groups from non-English-speaking backgrounds, the prevalence of emotional distress and mental illness is at least as high as and often higher than in non-immigrants [25]. The relatively high associations between the Thai DASS-42 scales in the Australian Thai-speaking sample are unlikely to be the result of translation difficulties or the scales failing to measure three separate constructs adequately. Rather, these correlations may reflect the differences between the mean age in the Australian-Thai sample, which was 40.5 years, in the English sample, which was 21.0 years, and in the Bangkok-Thai sample, which was 39.0 years. It is possible that those in the Australian Thai-speaking sample were likely to have experienced more negative life events and life stressors due to migration in comparison with those in the English and Bangkok-Thai samples, and therefore suffered a relatively more comorbid experience of negative affect in general.

5 Conclusion

Overall, the DASS appeared to be a psychometrically adequate and useful instrument for the measurement of depression, anxiety and stress in a Thai population. It provides evidence of the support of culturally sensitive translations and adaptations of existing measurement tools in this population. The Thai DASS-42 is particularly suitable for the purpose of regular assessment and evaluation of treatment outcomes. However, future research to investigate the utility and psychometric properties of the Thai DASS-42 to validate the instrument further will also further enhance cross-cultural comparisons.

6 Recommendation

Future research is required to confirm the study findings in similar Thai communities or in clinical settings. Research should focus on the effects of using the Thai DASS-42 and the long-term benefits of using standardized psychometric

scales that best match the needs of this population. Clinicians need to use culturally appropriate assessments such as the Thai DASS-42 to ensure accuracy.

Acknowledgements

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