ORIGINAL ARTICLE

Psychometric Properties of the Malay Translated Spielberger State-Trait Anxiety Inventory in Exploring Parental Anxiety

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ABSTRAK

Tujuan kajian ini adalah untuk menentukan sifat psikometrik 'State-Trait Anxiety Inventory' (STAI) yang diterjemahkan kepada Bahasa Melayu untuk kegunaan dalam meneroka beban kebimbangan di kalangan ibu bapa bagi kanak-kanak yang mendapatkan rawatan perubatan di hospital. Instrumen ini diberikan kepada 53 orang ibu bapa pesakit kanak-kanak yang dirawat di Jabatan Kecemasan dan 52 orang ibu bapa kepada pesakit kanak-kanak di unit fisioterapi. Konsistensi dalaman (α) untuk kebolehpercayaan bagi sub skala 'state' dan 'trait' adalah tinggi iaitu masing-masing 0.94 dan 0.84. Kebolehpercayaan bagi ujian ulangan menunjukkan skor yang pelbagai dengan hanya 25 item menunjukkan pekali korelasi intra-kelas yang signifikan, ICC (julat 0.60 - 0.94, 95% sela keyakinan CI, p<0.05) selepas 4 minggu ujian ulangan. Prestasi matriks berikutan analisis faktor adalah konsisten dengan struktur 4 faktor STAI yang asal. Walaupun terdapat beberapa item yang tidak mengikut matriks yang diharapkan, tetapi ianya tidak mengganggu prestasi secara keseluruhan. Oleh itu, versi terjemahan Bahasa Melayu STAI ini boleh ditermapakai untuk mengukur tahap kebimbangan ibu bapa bagi kanak-kanak yang mendapatkan rawatan di hospital, dengan mengambil perhatian di dalam tafsiran sesetengah item.

Kata kunci: analisis faktor, kebimbangan, kebolehpercayaan, psikometriks

ABSTRACT

The aim of the study was to determine the psychometric properties of the Malay translated State-Trait Anxiety Inventory (STAI) for use in exploring the burden of

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anxiety amongst parents of a child visited hospital for medical treatment. The instrument was administered to 53 parents of children seen in the Emergency Department and 52 parents in the outpatient Physiotherapy Unit. Internal consistency reliability (α) for state anxiety and trait anxiety subscale was high with values of 0.94 and 0.84, respectively. Test-retest reliability demonstrated wide range of scores with only 25 items showed significant intra-class correlation coefficients, ICC (range 0.60 – 0.94, 95% CI, p<0.05) after 4-weeks retest. Performances of matrix following a factor analysis were consistent with 4-factors structure of original STAI. A few items did not perform as expected but did not impair the overall performance. This Malay translated version is a valid and reliable measure of anxiety for parents with children visiting hospital for medical treatment, with caution in the interpretation of some items.

Keywords: anxiety, factor analysis, psychometrics, reliability

INTRODUCTION

Parental anxiety of a child being treated at the Emergency Department (ED) is expectedly high. Anxiety, although was reported by nearly half of patients in any given care context, was not routinely assessed objectively (O'Brien et al. 2001). Among factors associated with high parental anxiety in ED were related to uncertainty of a child illness and perceived long hour waiting time (Holm & Fitzmaurice 2004; Wray et al. 2011).

There is scanty literature on the impact of high parental anxiety in ED, and none with any reported measurable levels of anxiety. The magnitude of parental anxiety can be transferred to the child and it interferes with the ability to care for the child, as suggested by studies investigating the impact of parental anxiety of hospitalized child (Tiedeman 1997; Hasan Tehrani et al. 2012). As part of a research program to investigate the context and management of anxiety in relation to emergency visit for a sick child in acute unplanned childhood hospitalization in ED (AUCHED), we sought first to measure anxiety levels of the accompanying parent.

The Spielberger 1983 State-Trait Anxiety Inventory (STAI) form-Y identified as an appropriate tool because of its ability to measure the parents' state of anxiety (Spielberger et al. 1983). It consists of two subscales, the state anxiety (S-anxiety) evaluates the current state of anxiety and the trait anxiety (T-anxiety) evaluates relatively stable aspects of "anxiety proneness". It has 40 items, in which 20 items allocated to each of subscales. Responses are rated on a 4-point Likert scale with a range of scores for each subscale is 20 to 80 with higher score indicating greater anxiety. A cut-off point to detect clinically significant anxiety varies with few of the studies suggesting for 39 to 40 while other studies suggesting for higher cut-off

point i.e. 54 to 55 (Julian 2011). Other measure of anxiety such as Beck Anxiety Inventory (BAI) and Hospital Anxiety and Depression Scale (HADS) are not designed to detect changes in the perception of anxiety over much shorter period of time as in ours. As of current development, STAI remains the only option for a reliable valid and widely used measurement tool that can readily detect changes of anxiety throughout the treatment phase of an acute care setting.

Validation of STAI has taken place in various countries. The English version of STAI validated among Malaysian subjects demonstrated high reliability (Quek et al. 2004; Vitasari et al. 2011). Meanwhile, previous studies of factor structure of STAI have supported 2 (anxiety state and anxiety trait) and 4 (anxiety state absent, anxiety state present, anxiety trait absent and anxiety trait present) factors structure (Spielberger et al. 1983). However, there are few arguments regarding factor structure of the STAI particularly trait subscale which is said to measure element of depression rather than anxiety.

Cultural differences are known to have an impact to social anxiety. The experience and expression of emotions are subjective and influenced by a person's cultural background (Hofmann & Hinton 2014). To the best of our knowledge, the Malay translated STAI has never been validated. The aim of this study was to assess the psychometric properties of the Malay translated STAI to measure parental anxiety in relation to hospital visit for a sick child, and validate its use as a study instrument to measure anxiety in the target population mentioned. A culturally accepted questionnaire may generate further research in the aspect of anxiety coping strategies in Malaysian population.

MATERIALS AND METHODS

THE TRANSLATION PROCESS

The Malay translated version of STAI form-Y obtained from the licensee underwent a professional translation and quality review by a qualified local translator for numerous translation mismatches and unusual use of Malay language. This review, including a back translation process, proofreading for errors (translation, typographic and spelling), recreating and typesetting a new PDF version has created the new version of Malay translated STAI used in the study. The licensee was informed of this new version and its intention to proceed with validation.

PRE-TEST

The pre-test study was conducted among a random sample of 20 parents of children admitted to ED to get their response whether they could understand the questions and it formed part of the face validity. The feedback by respondents was used to improve on the questionnaire. The final form of the Malay translated STAI was accomplished and prepared for the validation study.
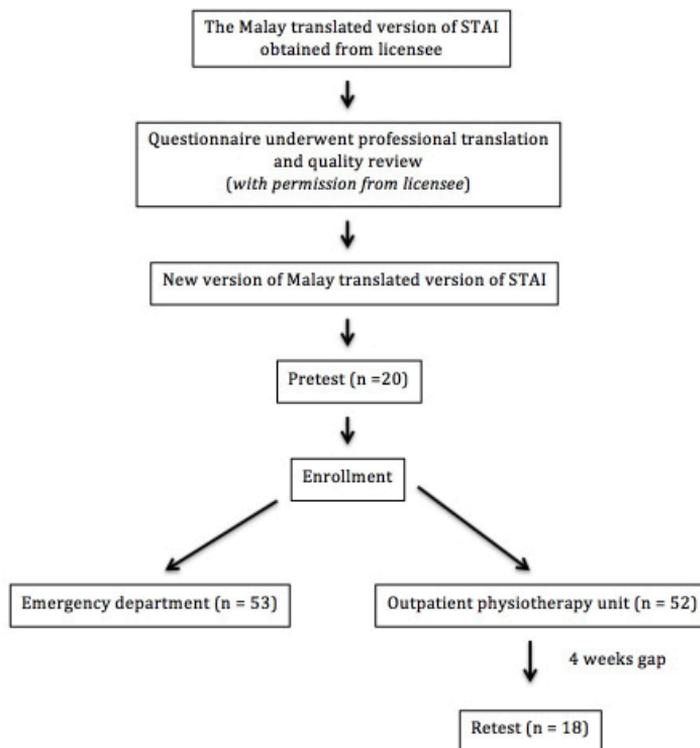
Figure 1: Flow diagram of the study process.

STUDY SETTING AND POPULATION

A three-month cross-sectional study (July 2015 to September 2015) was conducted at Universiti Kebangsaan Malaysia Medical Centre (UKMMC), an urban tertiary academic medical institution in Kuala Lumpur, Malaysia. A convenient sample of parents accompanying their children aged 12 and below presenting to the UKMMC ED and the outpatient physiotherapy unit (OPU) were approached for enrollment. The parents of sick children seen in ED for an acute medical treatment were regarded to be more anxious compared to the parents seen in OPU for an elective physiotherapy follow-up. These two groups of parents were taken for comparison. The outpatient setting of OPU was scheduled planned visit with a purpose for therapy, and not for assessment. This assumes a situation with less uncertainty. The study recognized that an acute clinical environment could cause significant anxiety and anguish to the subjects involved. Therefore, the study excluded parents in ED with critically ill and suspected abused children. The exclusion criteria took into account extreme anxiety that may potentially impair judgment. Parents or guardians who could not read or understand Malay language were also excluded. Flow diagram of the study process is shown in Figure 1. The institutional research ethics board approved the present study (FF-2015-

317).

PROCEDURE

A written consent was provided to all the eligible subjects. The self-administered Malay translated STAI form Y was filled by the subjects and returned to the researcher once completed with no time limit. They were asked to complete the Malay translated S-anxiety form Y-1 followed by T-anxiety form Y-2. Parents or guardians gathered from OPU were again approached at 1-month time during their next elective appointment to complete the Malay translated STAI for retest. Retest was not performed among parents or guardians seen in ED. At every point of patient contact, the dignity and rights after parents and children were respected and preserved.

SAMPLE SIZE

The STAI manual suggests a magnitude difference of 5 in STAI score would indicate significant change (Spielberger et al. 1983). A recent study comparing multiple psychometric scores including STAI between clinical and non-clinical samples (assumed as normal) revealed the difference of the mean scores was approximately 15 (Ozdel et al. 2014). Using the figures available, it was estimated that the standard deviation of the mean difference was 9. If the true difference in the score of parents between the two locations is on average of 15, the calculated sample size based on the detection of significant difference of mean scores

as suggested in literature is 52/group (Chow et al. 2002).

DATA ANALYSIS

All statistical analyses were conducted by using SPSS version 23.0 (SPSS Inc., Chicago, IL). Reliability was obtained by analyzing Cronbach's alpha (α) and test-retest intra-class correlation coefficients, ICCs. To explore the factor structure of the translated STAI, exploratory factor analysis was performed using principal component analysis (PCA) with varimax rotation. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA) and the Bartlett's test were applied to examine the appropriateness for factor analysis. The KMO value was set at the acceptable limit of 0.50 with the individual MSA higher than 0.50. Initial extraction based on Eigen value above 1 was performed to determine number of factor structure and distribution of factor loading. Fixed factor extraction was later performed based on previous study that supported 4-factor structure of original STAI; state anxiety present, state anxiety absents, trait anxiety present and trait anxiety absence (Suzuki et al. 2000; Vigneau & Cormier 2008).

RESULTS

A random sample of 105 parents was recruited and they completed the questionnaire for data analysis. The median age of parents was 35, IQR 8 years old with children aged between few days old until 12 years old. The mean S-anxiety score for all subjects

Table 1: Test-retest reliability analysis of the Malay translated STAI, N=18

State anxiety subscale	ICC, r	Trait anxiety subscale	ICC, r
Item 1	0.49	Item 21	0.94*
Item 2	0.87*	Item 22	-0.37
Item 3	0.73*	Item 23	0.01
Item 4	0.83*	Item 24	0.84*
Item 5	0.63*	Item 25	0.05
Item 6	0.69*	Item 26	0.05
Item 7	0.78*	Item 27	0.66*
Item 8	-0.19	Item 28	0.54
Item 9	0.87*	Item 29	0.55
Item 10	0.73*	Item 30	-0.54
Item 11	0.59	Item 31	0.16
Item 12	0.66*	Item 32	-0.27
Item 13	0.74*	Item 33	0.87*
Item 14	0.71*	Item 34	0.76*
Item 15	0.86*	Item 35	0.86*
Item 16	0.57	Item 36	0.69*
Item 17	0.88*	Item 37	0.62*
Item 18	0.51	Item 38	0.69*
Item 19	0.77*	Item 39	0.60*
Item 20	0.89*	Item 40	0.16
Total S-anxiety score	0.84*	Total T-anxiety score	0.39

Note: * indicates $p < 0.05$, ICC indicates intraclass correlation coefficient

was 39.05 ± 12.90. Parents in ED (n=53) had higher level of S-anxiety score, 45.79 ± 11.88 compared to parents in OPU (n=52), 32.17 ± 9.99. The mean T-anxiety score for parents in ED and OPU was 39.34 ± 6.93 and 35.50 ± 7.29, respectively.

RELIABILITY

The internal consistency for S-anxiety and T-anxiety subscales were high with Cronbach's alpha values of 0.94 and 0.84, respectively. The correlation between state and trait anxiety score among parents in OPU was acceptable, r=0.75, p<0.001 compared to parents in ED which demonstrated poor correlation, r = 0.28. Out of 52 parents recruited from OPU, 18 were again recruited for retest after 4-weeks. The ICC of the total S-anxiety test-retest score was excellent (r = 0.84, p<0.001) (Table 1). However, the ICC for the corresponding total T-anxiety test-retest score was poor (r = 0.39, p=0.327). Out of 40 items, only slightly more than half (25 items) demonstrated good to excellent reliability (ICCs, r between 0.60 to 0.94 with a 95% confidence interval, p value < 0.05).

FACTOR STRUCTURE

Factor analysis was carried out following agreeable conditions of the data set as

demonstrated by Kaiser-Meyer-Olkin (KMO) Measure of sampling Adequacy (MSA) value of 0.831 and a significant Bartlett's test of Sphericity, p<0.05. The initial PCA based on the eigen value greater than 1 extracted 9 factors with a cumulative variance explained was 69.9%. The first 4 factors were stronger, explaining 70% of explained variance. Following rotation, majority of the items were saliently loaded into the first four factors, which were parallel to the four factors structure of original STAI. Each factor could be identified as state anxiety absent for factor I, state anxiety present for factor II, trait anxiety absence for factor III and trait anxiety present for factor IV. An extraction based on fixed number of factors explained 53.3% of total variance. The original factor structure of STAI was mostly preserved with the exception of three items. These particular items, which were items 22, 24 and 25, should expectedly be loaded under factor IV. Instead item 22 had stronger factor loading into factor II (state anxiety present) and item 24 and 25 had higher factor loading into factor III (trait anxiety absent). The item 24 was the most conflictive as it did not saturate above 0.3 into its theoretical factor (trait anxiety present). Distributions of factor loadings based on fixed number of extraction are shown in Table 2.

DISCUSSION

The findings of the current validation study suggest that the Malay translated version of STAI was able to differentiate parental anxiety level between anxious and non-anxious situation. The Cronbach's alpha for the entire scale was high indicating homogeneity with good internal consistency reliability. These findings were consistent with an average Cronbach's values reported in literature (Barnes et al. 2002).

Compared to the previous validation study that was conducted in more control environment (Quek et al. 2004; Vitasari et al. 2011), the present study chose subjects in a situation of uncertainty or with high anxiety risk. Therefore, it is not surprising to see that the alpha value for state-anxiety subscale was higher. A similar situation has been demonstrated in a reliability study of STAI measured among parents of hospitalized child (Rojas-Carrasco 2009) with comparable alpha values.

While previous studies demonstrated high test-retest stability (Quek et al. 2004; Fountoulakis et al. 2006), the current study suggests only 25 items with significant coefficient agreement after retest. The ranges of the score changes between the two sessions turned out to be wide. The low level of agreement for trait-anxiety subscale was not in keeping with literature (Spielberger et al. 1983), similar to the findings reported in translated Dutch version (van der Ent et al. 1987). As mentioned earlier, test-retest was only performed among parents in OPU, assuming the subjects were relatively stable compared to subjects from ED who was not suitable for retest referring to transitory nature of anxiety states. However, the assumption was partially correct, as the study observed reduction of anxiety among parents in OPU contradicting the anxiety norm

Table 2: Factor structure of the Malay translated STAI on a four-factor fixed model.

ITEM	Factor 1	Factor 2	Factor 3	Factor 4
STAI 1	0.76	-0.32		
STAI 2	0.74			
STAI 5	0.82			
STAI 8	0.62			
STAI 10	0.85	-0.30		
STAI 11	0.70			
STAI 15	0.75	-0.31		
STAI 16	0.40			
STAI 19	0.77			
STAI 20	0.58		0.40	
STAI 3		0.64		
STAI 4	-0.31	0.73		
STAI 6	-0.35	0.66		
STAI 7		0.72		
STAI 9		0.75		
STAI 12		0.75		
STAI 13		0.65		
STAI 14		0.64		
STAI 17	-0.33	0.69		
STAI 18		0.67		
STAI 21			0.66	
STAI 23			0.52	
STAI 26			0.74	
STAI 27			0.48	
STAI 30			0.80	
STAI 33	0.31		0.76	
STAI 34			0.67	
STAI 36			0.53	
STAI 39			0.50	
STAI 22		0.43		0.33
STAI 24			0.41	
STAI 25			-0.45	0.43
STAI 28				0.72
STAI 29				0.81
STAI 31				0.64
STAI 32				0.65
STAI 35				0.75
STAI 37				0.75
STAI 38				0.39
STAI 40				0.53
% of variance	15.48	14.95	12.05	10.91

Note: Saturations lower than 0.3 are eliminated.

reported in literature (Spielberger et al. 1983). The STAI suggests that a person who possess higher trait of anxiety tend to have higher state of anxiety even in non-stressful condition (Spielberger et al. 1983). In the follow-up OPU setting, the "routineness" may explain anxiety reduction, consistent with previous studies that observed reduction of anxiety following serial scheduled follow-up after hospitalization (Tiedeman 1997; Lamontagne et al. 2001). In conclusion, the results of test-retest indicate some instability of the scale and suggest for cautious interpretation of individual scores and items.

The result of factor analysis was favorable with the original STAI with majority of items saliently loaded into similar factor structure of original STAI. It suggests that the scale supports the 4-factor model (state-anxiety absent, state-anxiety present, trait-anxiety absent and trait-anxiety present) of original STAI. However, the findings suggest that cautious interpretation of Malay translated item 22, 24 and 25, as these items did not fit into their theoretical factor. Previous factor studies of STAI in different countries suggested various versions of factor structures (Suzuki et al. 2000; Fountoulakis et al. 2006; Guillen-Riquelme & Buela-Casal 2011) except for the study done in Hawaii provided the best fit (Hishinuma et al. 2000). In all these instances, it was difficult to conclude if the findings were an accurate representation of the participants' performance. It could be related to irrelevant artifacts in the testing session such as environmental, psychological or cultural influences.

Several limitations are highlighted. The present study was conducted among parents with children seeking for acute medical treatment in ED, which is a fast-paced, dynamic environment. In high stress situation, the use of brief questionnaires is recommended. Questionnaires with many items can potentially impart excessive burden onto the respondents who are already experiencing emotional and physical limitations from the environment, thereby interfering with comprehension and completion of these long questionnaires (O'Brien et al. 2001). Many attempts of abbreviating this STAI instrument have been demonstrated in literature (Marteau & Bekker 1992; De Vries & Van Heck 2013; Fioravanti-Bastos et al. 2011; Perpiñá-Galvañ et al. 2011).

Secondly, test-retest reliability could not be assessed on parents in ED group. It is not possible to recreate the situational environment similar to the first encounter. Test-retest reliability was therefore only performed in the group of parents in OPU, as it is assumed every appointment is essentially the same event. In this case, it is argued the most suitable measure for reliability is dependent on the result of internal consistency rather than the test-retest results. Future validation study may be needed to consider the inclusion of subjects under non-stressful condition as a means to reduce error of measurement or random response.

CONCLUSION

In summary, the psychometric

properties of the translated STAI support its reliability and validity as measured by internal consistency and factorial analysis. However, the data suggest that the stability of the items assessed by test-retest reliability were partially consistent. The study identified the Malay translated version is reliable to measure parental anxiety with sick children among Malaysian population. Shortened version of Malay translated STAI may be beneficial to avoid redundancy of items sharing the similar properties.

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