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Original article

Reliability and validity of the family state and functioning assessment scale

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Background: Family significantly influences the health of family members in both positive and negative ways. There are limited instruments in Thailand for assessing family state and functioning on adult patients.
Objectives: To examine the validity and reliability of the family state and functioning assessment scale (FSFAS) which was designed to assess the extent one perceived family issues and functioning.
Methods: The scale was conducted on 1,200 Thai adults: 800 outpatients attending hospitals and 400 participants in the community. Of the sample, 70% were women and the mean age was 50.4 years. The psychometric properties of the scale were examined in terms of construct validity and reliability. Exploratory factor analysis with principal components analysis and varimax rotation was performed to assess factor structures. Cronbach's alpha coefficient was calculated to estimate reliability.
Results: Exploratory factor analysis showed that the scale had a five-factor structure (support, discipline, communication and problem solving, emotional status and relationship) that accounted for 57.3% of the total variance. The final version of the scale consisted of 25 items with a Cronbach's alpha coefficient of 0.87 for the total and 0.70 - 0.84 for the subscales.
Conclusions: The scale has acceptable factorial validity and internal consistency reliability which can be a useful instrument for assessing family state and functioning.

Keywords: Family state, functioning, reliability, validity.

Family significantly impacts on the health of family members in both positive and negative ways.[1] Having a close-knit and supportive family provides emotional support, economic well-being, and increases overall health. When family life is characterized by stress and conflict, the health of family members tends to be negatively affected. Therefore, evaluating family issues and family functioning is important to help understand and encourage families to perform their duties effectively. These can be conducted in several ways such as semi-structured interviews, observing the interactions in the family or between family members. But such methods require a lot of time and may not be practical in some clinical settings and research. Ease of administration and cost efficiency make self-report instruments attractive for assessing psychological constructs in large-scale research. Questionnaires are often developed for a particular purpose.[2] Family APGAR[3 - 5] is a 5-question assessment tool used for the rapid assessment of family function and dysfunction. It measures an individual's level of satisfaction about family relationships. The five dimensions of family satisfaction are: adaptation, partnership, growth, affection and resolve. The internal consistency is quite high (r = 0.59 - 0.80). However, many researchers have not found consistency of the score with assessment of family functioning by therapists and did not find support for using the measurement tool.[6 - 7]

The McMaster family assessment device (FAD)[8 - 9] consists of a 60-item self-report questionnaire that evaluates 6 dimensions of family functioning

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and overall general family functioning. The 6 dimensions of family functioning are as follows: problem solving, communication, roles, affective responsiveness, affective involvement, and behavior control. Internal consistency was estimated at 0.83 - 0.90 and intercorrelation was 0.4 - 0.6. Discriminant analysis found a statistical difference in family functioning between schizophrenic families and normal families. Family functioning has been implicated in the onset of child and adult psychopathology. FAD was translated into multiple languages and has been extensively used in a variety of research contexts and clinical practices. [10 - 13] Family assessment measure (FAM) was developed for family assessments according to seven key dimensions: task accomplishment, role performance, communication, affective expression, involvement, control, values and norms. It contained 92 items and provides measures of the family as a system and of the relationships.[14 - 15] As for Thailand, there are some instruments that measure family functioning and family health promoting behaviors such as the Chulalongkorn Family Inventory[16], the Thai Family Functioning Scale [17], the Thai Family Health Routines (TFHR) scale[18], the Family Health Promoting Behavior Scale[19]and the Perceived Family support. [20 - 21] The Chulalongkorn Family Inventory (CFI)[16] by Trangkasombat U consisted of 36 items to study family functioning in the families of psychiatric patients compared with nonclinical families[22] and to examine differences in family functioning between the families of patients with depressive disorders and with schizophrenia. [23] The Thai family functioning scale[17] was reported to have better psychometric properties than the Thai version of the FAD; however, it was tested only on adolescents aged 15 to 19. The Thai family health routines (TFHR) scale[18] which is used to measure the health of Thai families through their routine behaviors in daily life comprises 70 items. No instrument is now available for quickly and simply evaluating family issues and function in Thai medical outpatients and the community. Developing such an instrument is necessary for assessing family functioning and screening to identify families experiencing problems, in view of the increasing role of families in care for medical patients. Therefore, this study aimed to examine the validity and reliability of the family state and functioning assessment scale (FSFAS) which was designed to assess to what extent one perceived family issues and functioning.

Methods

Scale development and initial reliability estimates

A literature search and review was conducted covering the area of interest, family function assessment in medical patients. [2 - 21] Development of the family state and functioning assessment scale (FSFAS) was mainly based on the structural domains of Family Assessment Device from the McMaster Model of Family Functioning (MMFF)[8], Chulalongkorn family inventory[16] and the Thai family functioning scale. [17] The questionnaire was used to answer issues and functioning about emotional, support, communication and social interaction among members of the household. The scale was validated by content experts (family physicians, psychiatrists, psychologists and nurses) and initially composed of 30 items. Preliminary pilot testing was conducted on 30 participants. The Cronbach's alpha coefficient was 0.7. Five statements were adjusted for better understanding.

Scale validation and studying in participants

A cross-sectional descriptive study was conducted. The sample size must meet an optimal sample size for factor analysis that required respondents at least ten times the number of items [24] and a sample size of at least 1,000 might be appropriate for exploratory factor analysis. [25] For reducing the error we increased the sample size with 20% so the scale was conducted on 1,200 Thai adults aged over 18 years. Sample should be chosen to be as similar as possible to the relevant population, thus eight hundred outpatients from 2 hospitals and 400 participants from 2 communities in Bangkok, Thailand were asked to participate in the study. Data were collected using self-administered demographics questionnaires and the family state and functioning assessment scale (FSFAS).

FSFAS is a self-reporting questionnaire asking to indicate the degree to which participants agree with various statements on a four-point Likert scale ranging from "1 = strongly disagree" to "4 = strongly agree". The scale is composed of both positive and negative statements, and recoding score on negative statement items should be done before calculating the total score. The positive statements are items number 2, 4, 5, 6, 8, 9, 10, 12,17, 20, 23, 24, 25, 26, 27, 29, and 30; and, the negative statements are items number 1, 3, 7,11, 13, 14,15,16,18, 19, 21, 22, and 28. The total score of the FSFAS is obtained by summing raw scores across 30

items that can range from 30 to 120 and calculating the mean score. A higher score indicates a better family state and functioning.

Statistical analysis

In order to summarize the characteristics of the participants, descriptive statistics, percentages and frequencies were used for categorical variables and means and standard deviations were calculated for continuous variables. The internal consistency reliability was assessed using Cronbach's alpha. The construct validity was analyzed using exploratory factor analysis which was conducted by principal components extraction, followed by varimax rotation. Eigen values, relative magnitude and direction of factor loadings explaining variance and communality, were examined in these analyses. Kaiser's Eigen value of greater than 1 was used to determine the number of factors. Significance was set at alpha = 0.05; two-tailed for all statistical tests.

Results

The study population consisted of adults aged 18 – 90 years, with a mean age of 50.4 years (SD 16.1). Approximately 70% were women. Nearly half were married or living as married couples and 31% were single. About 29% had a primary school education, 24% had a high school diploma and 28.3% had a bachelor degree. Data are shown in Table 1.

The mean score of each item of the FSFAS ranged from 2.20 to 3.38(SD 0.80 - 1.02). The mean score of 30-item FSFAS was 84.32 (SD 11.13). The internal consistency analysis for the scale had a Cronbach's alpha coefficient of 0.82. Four items (item number 3, 18, 19 and 22) had corrected item-total correlation less than 0.2. After removing these items by proceeding 1 item at a time, and redoing the reliability analysis after each deleted item, the scale had a higher Cronbach's alpha coefficient of 0.84 - 0.86 as presented in Table 2.

Table 1. Demographic data of participants.

Variables	Number	Percentage
Sex (n = 1,174)		
Male	346	29.5
Female	828	70.5
Age (n = 1,158)		
≤ 25 years	106	9.1
26 - 35	132	11.4
36 - 45	178	15.4
46 - 55	265	22.9
> 55	477	41.2
Mean (SD) = 50.4 years(16.1), range = 18 - 90		
Marital status (n = 1,185)		
Married	564	47.6
Single	369	31.1
Divorced/separated	161	21.3
Educational level (n = 1,182)		
No school	19	1.6
Primary school	344	29.1
Secondary school	144	12.2
High school or diploma	284	24.1
Bachelor degree	335	28.3
Master degree and above	56	4.7
Occupation (n = 1,176)		
Unemployed	264	22.5
Employee	323	27.5
Business	278	23.6
Government officer	147	12.5
Others	164	13.9

Table 2. Reliability analysis based on the corrected item-total correlation (CITC) and Cronbach's alpha coefficient if item was deleted.

Item	Mean	SD	CITC	Cronbach's Alpha if Item Deleted
3.	2.53	0.83	0.042	0.837
18.	2.20	0.91	-0.564	0.857
19.	3.38	0.82	0.010	0.838
22.	2.60	0.96	0.066	0.838

Exploratory factor analysis

The structure of the FSFAS was analyzed using principal components extraction. As for the 26-item sets, the requirements for exploratory factor analysis in this sample were fulfilled (Kaiser-Meyer-Olkin measure of adequacy = 0.913, Bartlett's test of sphericity $P < 0.001$). Communality of the 26 items ranged 0.36 to 0.73. Using the initial factor solutions, items were removed step-by-step based on the following criteria: factor loading < 0.40, cross-loading > 0.30, communality < 0.30 and corrected item-scale correlation < 0.30. [26] According to these criteria five factors were extracted and the scale had 25 items with factor loadings between 0.52 to 0.80. Each factor had Eigen values greater than 1. Exploratory factor analysis showed that the scale had a five-factor structure that accounted for 57.3% of the total variance. Factor 1 accounted for 13.8% of the variances, and consisted of 5 items that we called family support (being able to access family members that a person can rely upon if needed). Factor 2 accounted for 12.5% of the variances, and consisted of 6 items that we called family discipline (the process to help family member learn appropriate behaviors and share responsibilities). Factor 3 accounted for 11.8% of the variances, and consisted of 5 items that we called communication and problem solving (how family members exchange verbal information and the family's ability to resolve problems). Factor 4 accounted for 10.6% of the variances, and consisted of 5 items that we called emotional status (emotions that are shared with and between family members which measures the satisfaction with the intimacy and emotional interaction that exist in the family). Finally, the fifth factor accounted for 8.5% of the variances, and consisted of 4 items that we called family relationship (a person's perception of the quality of his or her family relationship functioning). The total score of the 25-item FSFAS is scored by adding the responses (1- 4) for each scale and divided by the number of items in each scale (4 - 6). A higher score indicates a better family state and functioning (Table 3).

Reliability

The internal consistency analysis for total scale and each subscale were calculated. The final version of the scale consisted of 25 items with a Cronbach's alpha coefficient of 0.87 for the total and 0.70 - 0.84 for the subscales (Table 4).

Table 3. Factor loadings from principal axis factor analysis with varimax rotation.

Component	Extraction Sums of Square Loading			Rotation Sums of Square Loading		
	Total (Eigenvalue)	% of Variance	Cumulative%	Total (Eigenvalue)	% of Variance	Cumulative%
1	7.476	28.755	28.755	3.589	13.802	13.802
2	3.925	15.098	43.853	3.247	12.487	26.289
3	1.344	5.168	49.020	3.077	11.833	38.122
4	1.133	4.357	53.378	2.765	10.636	48.759
5	1.021	3.927	57.304	2.222	8.546	57.304

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.913, Ballet's test of Sphericity ; $P < 0.001$

Table 4. Domains and Cronbach's alpha coefficient of the FSFAS-25 items.

Domains	Number of Items	Cronbach's alpha coefficient
Family support	5	0.84
Discipline	6	0.83
Communication and problem solving	5	0.82
Emotional status	5	0.70
Relationship	4	0.77
Total	25	0.87

family support : being able to access family members that a person can rely upon if needed; family discipline : the process to help family member learn appropriate behaviors and share responsibilities communication and problem solving : how family members exchange verbal information and the family's ability to resolve problems ; emotional status : emotions that are shared with and between family members which measures the satisfaction with the intimacy and emotional interaction that exist in the family ; family relationship : a person's perception of the quality of his or her family relationship functioning.

Discussion

This study was carried out to examine the psychometric properties of the family state and functioning assessment scale, in a sample of Thai adults from community and hospital settings. The results indicate that the FSFAS is a psychometrically sound instrument.

According to exploratory factor analysis, Kaiser-Meyer-Olkin Measure of Sampling Adequacy – this measure varies between 0 and 1, and values closer to 1 are better. A value of .6 is a suggested minimum. This scale had KOM = .913 and significant Bartlett's test of sphericity ($P < .001$). These tests showed good results to conduct principal components analysis. Principal components analysis is a method of data reduction that requires a large sample size. This study was conducted on 1,200 Thai adults that met an optimal sample size for factor analysis since at least 1,000 families were needed for the instrument evaluation. The structure of the FSFAS was analyzed using principal components extraction. The results showed that the scale had a five-factor structure that accounted for 57.3% of the total variance. It consisted of 25 items with factor loading between 0.52 to 0.80. Each factor had an Eigen value greater than 1. These indicated that the scale had acceptable factorial validity.[26]

The final version of the scale consisted of 25 items with a Cronbach's alpha coefficient of 0.87 for the total and 0.70 - 0.84 for the subscales. A high value of total alpha indicates good reliability. The internal consistency of this total scale was closely similar to previous studies.[8 - 9, 16]

This short scale which measures family functioning is appropriate for use in clinical practice and research. It can assist the clinician in determining how to build on current family strengths, as well as identify areas for growth that could be beneficial for promoting families functioning effectively. Family assessment can be used for the early identification of patients at risk of poor family functioning and screening to identify families experiencing problems. Furthermore, it may be possible to improve medical conditions and adherence by working with the family in specific areas of family functioning.[27 - 29] Nevertheless, this study had some limitations that should be noted. First, the measures we used were limited as they relied on participants' self- reports. Second, the proportion of women was higher than that of men in this study. It is possible that women have slightly outnumbered the men in the total population for Thailand and might be more willing to participate in the study. However, we enrolled more than three hundred men that was also an adequate sample size for the representativeness of the relevant population. Finally, the sample consisted of participants mostly living in Bangkok. Further studies should be conducted in populations from other regions of Thailand.

Conclusions

FSFAS has acceptable factorial validity and internal consistency reliability that can be used as a quick and effective tool in both clinical practice and research to assess the extent one perceived about family issues and functioning. These would provide valuable information for promoting effective

functioning of families and hence improve physical and mental health status.

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Conflict of interest

None of the authors has any potential conflict of interest to disclose.

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