FACTORIAL VALIDATION OF THE CHINESE GENERAL FUNCTIONING SUBSCALE (GF-12) OF THE FAMILY ASSESSMENT DEVICE IN MALAYSIA

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Abstract

The objective of this study was to determine the factorial validity of the Chinese version of the General Family Functioning subscale (GF-12) and to assess parents' perceived family functioning of children with or without chronic respiratory disease in Malaysia. Thirty two parents of children with chronic respiratory disease and 30 parents of healthy children were recruited. The GF-12 was administered at baseline and 2 weeks later. Confirmatory factor analysis showed that our instrument was a 1-factor model assessing general family functioning. Cronbach's α value was 0.950. Test-retest reliability coefficient ranged from 0.490-0.790. The overall mean (standard deviation) score was not significantly different between parent's perceived family functioning of children with or without respiratory disease [1.83(0.63) versus 1.65(0.46), p=0.385]. The Chinese version of the GF-12 was found to be a valid and reliable instrument to assess family functioning in Malaysia. Parents in the present study showed healthy perceived family functioning (total score >2.00).

Keywords: *Chinese, Family Functioning, Parents, Children with Chronic Respiratory Disease, Factorial Validity*

Introduction

Family functioning refers to the "quality of family life at the systemic and dyadic levels and concerns wellness, competence, strengths and weaknesses of a family"(1). A healthy family is characterized by how well each family member deals with a variety of tasks and problems in their daily lives (2). Assessment of family functioning provides some insight into a family member's response to and influence on, the child's medical condition (3).

Studies on parents' perceived family functioning have been performed in chronic childhood conditions, such as type 1 diabetes, cancer, cystic fibrosis, epilepsy, sickle cell disease, asthma, chronic pain, inflammatory bowel disease and obesity (4). Results from these studies are conflicting. Some studies showed significantly poorer family functioning (5,6), while others found no difference in problem solving and family cohesion (7,8). This may be due to the different methodologies used. Some studies used questionnaires to measure family functioning (7,8); some studies observed family meal times (5) (using McMaster Mealtime Family Interaction Coding System); whilst some studies interviewed family members (6) (using the Camberwell Family Interview tool) to assess expressed emotion between spouses, or between parent and child. Some studies did not have a comparator group (9), while other studies used healthy siblings or healthy children from the general population as controls (5-7).

A number of family functioning instruments have been used in western countries, such as the McMaster Family Assessment Device (FAD) (10), the Family Environment Scale (FES) (11), the PedsQL™ Family Impact Module (12), the Family APGAR (13), the Self-report Family Inventory (SFI) (14), and the Family Functioning Index (FFI) (15).

Instruments that have been validated in Malaysia are the Malay PedsQL Family Impact Module (16) and the Malay FES (17). A search of published literature revealed that

there is no validated instrument available in Chinese to assess parents' perceived family functioning in Malaysia. A questionnaire that has been validated in the country of origin in Mandarin may not necessarily be interpreted in the same way in Malaysia. A typical Chinese family in China establishes a cultural sphere characterized by Confucianism, where hierarchy and a tightly knit family structure exists (18). Due to acculturation (defined as a process where an individual needs to adopt similar beliefs, values and lifestyle to adapt to a new cultural environment) (19), Chinese that have emigrated to other countries can be influenced by their new living conditions. Some North American Chinese have adopted a bicultural family system where they are familiar with both Western and Chinese cultures. They are bilingual and can communicate with each other in either Chinese or English (20). Similarly, some Malaysian Chinese can be influenced by the cultural diversity that exists in Malaysia, and might adhere to a different family system, and have different family functioning from their counterparts in China.

We selected the General Family Functioning Subscale (GF-12) from the Family Assessment Device (FAD) to assess family functioning, as it only has 12 items and is easy to administer in a busy clinic setting (21,22). All items in the GF-12 subscale were highly correlated with other dimensions of the FAD (21,22). The GF-12 was also found to be free from cultural bias when assessed in different populations and countries around the world. It has been validated and translated into different languages: Armenia (21), Chinese (22), Spanish (23), Italian (24), and French (25).

To date, a search of published literature revealed that there is no validated instrument available in Mandarin to assess parents' perceived family functioning in Malaysia. The aim of our study was to determine the factorial validity and reliability of the Chinese version of the GF-12 subscale in assessing family functioning in families of children with respiratory illness in Malaysia.

Method

This validation study was conducted from February 2012 to December 2013 in a tertiary hospital in Malaysia.

Participants

The patient group consisted of parents of children with chronic respiratory disease attending the Respiratory Clinic. Parents who had children aged 18 years and below, with any chronic respiratory disease for a minimum of six months and who were able to read and complete the questionnaire in Mandarin, were recruited. Excluded were parents of children with other chronic diseases or coexisting chronic medical conditions.

To assess discriminative validity, parents of healthy children (aged 18 years and below) were recruited as controls from the Antenatal and General Paediatric Clinics and the community. Excluded were parents of mentally or physically challenged children. Controls were matched for the child's gender and age.

Sample size

In order to conduct factor analysis, the subject-to-item ratio should be 5:1 (26). There are 12 items in the GF-12 subscale. Therefore, the total number of participants required for this study was 60.

Instruments

Baseline demographic questionnaire

This instrument was used to collect parents' baseline demographic information (such as age, ethnicity, (not found in table 1) educational level, occupation and household income). In addition, their child's demographic and clinical information (such as age, type of school (not found in table 1), gender, type of chronic respiratory disease and duration of chronic respiratory disease) were also collected.

The GF-12 instrument

The GF-12 is a self-administered instrument with a 4-point Likert scale, ranging from 1 (strongly agree) to 4 (strongly disagree) (10). Participants were required to rate how well an item described their families in general. Reversed score items (items 1, 3, 5, 7 and 11) were transformed by subtracting them from 5. To score, all items were summed up and the total score was then divided by the number of items. Scores range from 1 (healthy) to 4 (unhealthy). A score of 2 and above indicates problematic family functioning (10).

We used the simplified Chinese version of the GF-12 subscale that was translated and validated in Hong Kong (22). Permission to use this instrument was obtained via email. Face and content validity was tested in five parents of healthy children who were asked to comment on the simplicity, clarity and relevance of the questions on the GF-12 subscale. Participants encountered no problems in answering the questionnaire.

Procedure

After obtaining written informed consent (including consent to data being published), baseline demographic information of the parent and child, as well as the child's medical history were also collected. A parent (usually the main caregiver) completed the GF-12 subscale. Instructions and queries were handled by a researcher who also ensured that all questions were answered. The same group of parents completed the same questionnaire two weeks later. Questionnaires were sent via conventional mail (n=50) and email (n=12). Reminders were made via telephone calls to maximise response rates. Any significant changes or events that had occurred in the child or family within the two weeks study period were documented through telephone calls.

Ethics approval

Ethics approval (ref number: 896.10) was obtained from the University Malaya Medical Centre ethics committee.

Statistical Analysis

Statistical analysis was conducted using the Statistical Package for Social Sciences (SPSS) version 20 (Chicago, IL, USA) and Analysis of Moment Structure (AMOS) version 20 (Chicago, IL, USA).

Confirmatory factor analysis (CFA) was used to test whether the data fitted the original 1-factor model. Various standard fit indices were used: the chi-square/df ratio (CMIN/DF), comparative fit index (CFI), goodness of fit index (GFI), adjusted goodness-of-fit index (AGFI), and the root-mean-square error of approximation (RMSEA). As our data was not normally distributed, the unweighted least squares (ULS) estimation method was used. The model chi-square statistic was used to determine the fit of each model to the observed data. A CMIN/DF value close to 1.00, a non-significant model chi-square (p>.05), (27) and values of CFI, GFI, AGFI and ULS indices greater than .90 indicate an adequate model of fit (28). Likewise, the RMSEA index (which indicates the amount of residual error), was considered adequate if the value was less than .7 (29). Modification index coefficients (MDI) were used to check any cross-loadings between the latent variables (27).

The internal consistency of the subscale was assessed by calculating Cronbach's α value, with values of .70 and above indicating acceptable internal consistency (30). Corrected item-total correlation was used if the Cronbach's α value was less than .70 and any item with a correlation of less than .30 was removed. The Cronbach's α value for each item that represented the effect of removing that item from the instrument was then computed.

Test-retest reliability was also assessed using Spearman's rho correlation coefficient. Since data was not normally distributed, non-parametric test (eg. Mann-Whitney U test) was used to determine the discriminant validity of the scale and for test-retest. A *p*-value <.05 was considered statistically significant.

Results

A total of 69 parents were approached. However, only 62 parents [parents of children with chronic respiratory disease(32, 51.3%) and parents of healthy controls(30, 48.4%)] agreed to participate (response rate: 89.9%). No significant differences in the demographic characteristics were found between the two groups (Table 1). Majority of the patients had asthma.

Table 1: Demographic characteristics of parents in the control and patient groups

	No. (%)		*p*-value*
	Control (n=30)	Patient (n=32)	
Primary caregiver			
Mother	25(83.3)	26 (81.2)	.864
Father	5(16.7)	6 (18.8)	
Mean age ±SD [median] [range] (years)	39.6 ± 8.8[39] [27-65]	38.6 ± 6.1 [38] [27-54]	.592
<29	3 (10.0)	3 (9.4)	
30-39	16 (53.3)	13 (40.6)	
40-49	7 (23.4)	14 (43.8)	
>50	4 (13.3)	2 (6.2)	
Occupational status			.428
Full time (≥30 hours/week)	23 (76.7)	19 (59.3)	
Part time (<30 hours/week)	1 (3.3)	3 (6.4)	
Housewife	4 (13.3)	10 (31.3)	
Retired	2 (6.7)	1 (3.0)	
Highest education level completed			.613
Primary school (6 years of education)	3 (10.0)	1 (3.1)	
High school (11 years of education)	13 (43.3)	18 (56.3)	
Diploma/vocational training (12-13 years of education)	8 (26.7)	7 (21.9)	
Bachelor and higher (more than 14 years of education)	6 (20.0)	6 (18.8)	
Household income per month (RM)			.176
<1999 (<USD 549)	3 (10.0)	3 (9.4)	
2000-2999 (USD550-784)	13 (43.3)	5 (15.6)	
3000-3999 (USD785-1049)	5 (16.7)	9 (28.1)	
4000-4999 (USD1050-1309)	2 (6.7)	5 (15.6)	
>5000 (>USD1320)	7 (23.3)	7 (31.3)	
Child's gender			
Male	16 (53.3)	24 (75.0)	.075
Female	14 (46.7)	8 (25.0)	
Child's age Mean age ±SD median [range] (years)	6.9±5.0[5.7] [0-17]	7.7±6.7 [6.6] [0-17]	.574
Type of respiratory disease			
Asthma	N/A	20 (62.5)	N/A
Chronic bronchitis	N/A	12 (37.5)	
Duration of respiratory disease (years) (mean± SD) median [range]	N/A	5.7±4.3[5.0] [.8-15]	

Note. SD= Standard deviation; RM= Ringgit Malaysia, USD 1= RM3.2; NA=not applicable

Using CFA, the results confirmed the Chinese GF-12 was a good model of fit. Standardized factor loadings for other items were highly correlated to the general family functioning factor, with loadings from .650 to .880 (Figure 1).

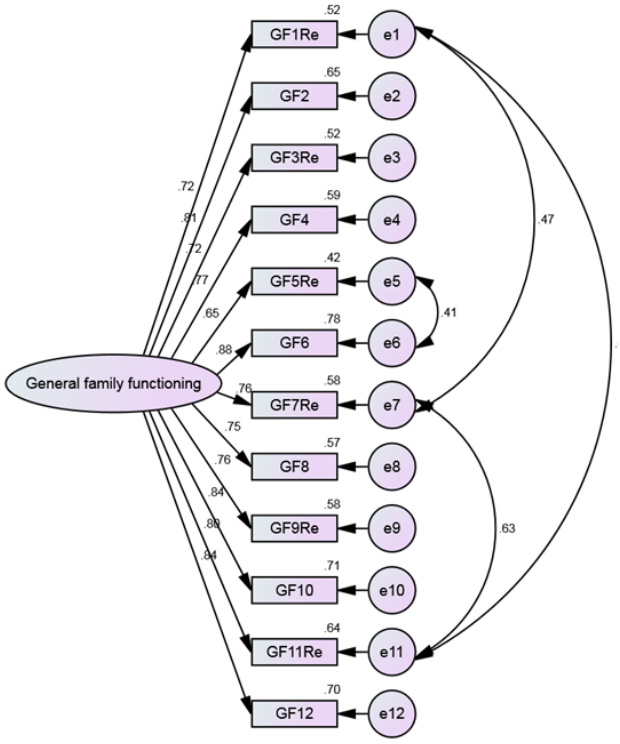

Figure 1: The factor structure of the Chinese version of the GF-12 subscale in Malaysia using Confirmatory Factor Analysis

The overall Cronbach's α value of the Chinese version of the GF-12 subscale was .950. Corrected item-total correlations were more than .30 (Table 2). The deletion of any item did not improve the overall Cronbach's α of .950. Hence, all 12 items were retained.

Test-retest reliability was assessed in 56 (90%) participants after two weeks (Table 2). Six parents were lost in follow up: two parents (3.0 %) were not contactable and four (6.5%) failed to complete the second set of questionnaires within the given period. All items showed moderate to high Spearman's rho correlation coefficients (.45 to .83; p<.001). Test-retest revealed that only one out of 12 items (item 11) was significantly different at retest in the control group (p=.03). (not found in table 1)

There was no difference in the GF-12 subscale scores between the patient and the control groups [patient group=1.83 (SD .63)] versus [control group= 1.65 (SD .46)], *p*=.395.

Demographic factors such as parent's gender, age, ethnicity (not found in table 1), child's age, duration of a child's respiratory disease, employment status, educational level and marital status (not found in table 1) were not found to be associated with the overall GF-12 subscale score in the patient group.

The psychometric properties of the Chinese version of the GF-12 subscale validated in Malaysia were compared with other GF-12 subscales validated elsewhere (Table 3). Psychometric findings were similar among these studies.

Discussion

The Chinese version of the GF-12 subscale was found to be a factorially valid and reliable instrument for assessing general family functioning in Malaysia.

In our study, CFA revealed that the Chinese version of the GF-12 subscale was a 1-factor model (31). Our findings concurred with the original English validation of the GF-12 subscale in the United States (32) , but differed from the Italian validation of the GF-12 subscale. The authors of the Italian GF-12 subscale validation reported that their instrument was a 4-factor model with the following domains: competence, emotional communication and center-on-self (24). A possible explanation could be the way American families behave, as compared to Italian families. Generally, Italian families are more emotional, self-sacrificing, and protective over their family members as compared to American families. In addition, Italian mothers tend to do all the family household chores, whereas American families will have their chores divided among family members. Hence, some modification of the GF-12 subscale was required for the Italian population (24).

In our study, although family functioning was found to be higher in parents of healthy children versus parents of children with respiratory illness, this difference did not reach statistical significance. Our findings were similar to other studies which assessed physical chronic illness such as spinal cord injury (33). However, a significant difference in family functioning was noted in caregivers of patients with major depression and the community (23,34). There are several possible explanations for these discordant results. According to Rolland (35), family functioning and adaptive functioning in a family may be affected by the key characteristics of a chronic disease. Compared to physical illnesses, the course of a psychiatric illness is unpredictable and often interrupted by relapses (4). As a result, caregivers experience more stress and difficulty in adjusting to unpredictable events, giving rise to worse family functioning. Other variables such as the number and age of the siblings in a family could also influence family functioning, but this was not examined in our study.

The Chinese version of the GF-12 subscale showed adequate psychometric properties (internal consistency and test-retest). Our findings were similar to previous GF-12 subscale validation studies (Table 3). The consistent psychometric properties across different studies and cultures indicate that the GF-12 subscale was an appropriate instrument to measure family functioning. The significance of the present study was that a validated and reliable GF-12 subscale can be used as a quick and effective tool to identify unhealthy family functioning.

There are several limitations in our study. Although the rules for a validation study were met, the sample size in our study (n=62) was small compared to other GF-12

Table 2: The psychometric properties of the Chinese version of the GF-12 subscale

Item	Corrected item-total correlation	Cronbach's α if item is deleted	Test (baseline) (n=62)				Discriminative validity		Retest (n=56)				Test-retest reliability	
			Control (n=30)		Patient (n=32)		Mann-Whitney U test		Control (n=27)		Patient (n=29)		Spearman's rho correlation coefficient	
			Mean (SD)	Median	Mean (SD)	Median	*z*-value	*p*-value	Mean (SD)	Median	Mean (SD)	Median	*z*-value	*p*-value
Planning family activities is difficult because we misunderstand each other#	.822	.944	1.53 (.63)	1.00	1.90 (.77)	2.00	-.34	.742	1.62 (.30)	2.00	1.93 (.84)	2.00	.71	<.001
In times of crisis we can turn to each other for support	.755	.944	1.50 (.51)	1.50	1.65 (.70)	2.00	-.47	.647	1.48 (.50)	1.00	1.75 (.83)	2.00	.76	<.001
We cannot talk to each other about the sadness we feel#	.686	.948	2.03 (.85)	2.00	2.06 (.84)	2.00	-.80	.420	1.93 (.82)	2.00	2.10 (.72)	2.00	.49	<.001
Individuals are accepted for what they are	.728	.945	1.53 (.57)	1.50	1.65 (.70)	2.00	-1.18	.242	1.62 (.88)	1.00	1.76 (.79)	2.00	.65	<.001
We avoid discussing our fears and concerns#	.651	.948	1.90 (.54)	2.00	2.19 (.85)	2.00	-.87	.398	2.15 (.99)	2.00	2.23 (.79)	2.00	.45	<.001
We can express feelings to each other	.864	.941	1.77 (.56)	2.00	1.97 (.73)	2.00	-.32	.755	1.74 (.59)	2.00	1.97 (.68)	2.00	.72	<.001
There are lots of bad feelings in the family#	.793	.948	1.50 (.57)	1.00	1.69 (.82)	1.50	-.81	.425	1.56 (.80)	1.00	1.62 (.77)	1.50	.60	<.001
We feel accepted for what we are	.723	.945	1.50 (.50)	1.50	1.65 (.60)	2.00	-.54	.594	1.63 (.63)	2.00	1.76 (.64)	2.00	.55	<.001
Making decisions is a problem for our family#	.756	.944	1.73 (.69)	2.00	1.84 (.72)	2.00	-.19	.859	1.81 (.68)	2.00	2.00 (.76)	2.00	.53	<.001
10. We are able to make decisions about how to solve problems	.806	.943	1.76 (.57)	2.00	1.81 (.73)	2.00	-.42	.680	1.66 (.63)	2.00	1.87 (.77)	2.00	.84	<.001
11. We don't get along well together#	.822	.942	1.50 (.57)	1.00	1.72 (.81)	2.00	-.50	.627	1.70 (.77)	2.00	1.86 (.87)	2.00	.70	<.001
12. We confide in each other	.795	.943	1.60 (.56)	2.00	1.84 (.85)	2.00	-.50	.625	1.51 (.58)	2.00	1.87 (.86)	2.00	.79	<.001
Total score	N/A	N/A	1.65 (.46)	1.71	1.83 (.63)	1.82	-1.00	.922	1.68 (.46)	1.67	1.89 (.58)	1.75	.92	<.001

Note. # Items are reversed. N/A=not available; SD=standard deviation ^Six caregivers were excluded from the test-retest as they were lost to follow-up, leaving 56 caregivers for the test-retest.

Table 3: Comparison of the psychometric properties of the Chinese version of the GF-12 subscale validated in Malaysia versus those validated elsewhere

Authors	Language (Country)	n	Sample		Cronbach's alpha value for GF-10/GF-12 subscale	Test-retest reliability
			Patient group [Mean (SD)]	Control group [Mean (SD)]		
Present study	Chinese (Malaysia)	62	Parents of children with chronic respiratory disease aged 1-17 years [1.83 (.63)]	Parents of healthy children aged 1-17 years [1.65 (.46)]	.950	.850
Original study: Epstein et al.,1983 (10)	English (Canada)	294	Psychiatric adult patients >18 years [2.6 (.58)]	Community adults >18 years [1.96, (.53)]	.920	.710
Shek, 2001 (22)	Chinese (Hong Kong, China)	732	Adolescents with behavioural and emotional problems [2.45 (.51)]	Healthy adolescents [2.28, (.48)]	Not reported	.769
Kazarian, 2010 (21)	Armenian (Lebanon)	558	None	Healthy adolescents [not reported]	.805	Not reported
Speranza et al., 2012 (25)	French (France)	323	Relative(s) of psychiatric adult patients & [2.30 (.30)] medical adult patients and their relatives [2.10 (.30)]	Healthy adults [1.80, (.40)]	.766	.889
Barroilhet et al., 2009 (23)	Spanish (Spain)	120	Adults with psychiatric [not reported] and medical illness [not reported]	Healthy adults [1.43, (.33)]	.867	.915
Roncone et al. 1998 (24)	Italian (Italy)	261	Adult relative(s) of patients with psychiatric [1.89 (.40)]; & medical problems [1.98 (.47)]	Healthy adults [1.72, (.47)]	.767	.895
Wenniger, et al. 1993 (36)	Dutch (Dutch)	233	Community adults >18 years [1.68 (.45)]	None	.890	Not reported

validation studies. This was because we only validated the GF-12 subscale as a standalone instrument, whereas other studies validated the entire FAD which consisted of 60 items (which requires a larger sample size). The statistical power of our sample size (37), was assessed and found to attain a power of 0.5, which was adequate. Secondly, convergent validity was not performed due tolack of available Chinese validated instruments assessing family functioning in Malaysia during our study period. The GF-12 also failed to differentiate between families of children with chronic respiratory disease and healthy controls. Using the GF-12 on patient groups with physical or cognitive disability might yield different results. Future validation studies of the GF-12 subscale should test the correlation of the GF-12

subscale with other variables related to family functioning such as parenting stress, to assess test for criterion-related validity.

Conclusions

The Chinese version of the GF-12 subscale was found to be a factorially valid and reliable instrument to assess the parents' perceived family functioning of children with and without respiratory disease in Malaysia. Parents of children in both groups perceived good family functioning. No significant difference in family functioning was found between these two groups.

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Competing interests

The authors declare that they have no competing interests.

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