



## Psychometric evaluation of the Persian version of Family Management Measure

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### ABSTRACT

**Aims** Childhood chronic disease is rising dramatically throughout the world. This study aimed to determine the construct and convergent validity and internal consistency of Family Management Measure.

**Instrument & Methods** This descriptive study was carried out with a methodologic research approach involving 300 mothers of children with chronic diseases in 2017. The convergent validity was assessed, and the confirmatory factor analysis was performed for construct validity. The internal consistency of the tool was assessed by calculating Cronbach's alpha coefficient. Corrected Item Total Correlation of items was calculated. Lisrel 8.8 and SPSS 24 were used.

**Findings** The results showed that the model of the six scales had a relatively good index. The correlation between the FaMM scales and The General Functioning Scale in the convergent validity was significant and in the predicted directions ( $r = -0.293, -0.379, -0.621, 0.255, 0.401, 0.358$ ). The Cronbach's alpha values for the scales were between 0.78 and 0.94, and the corrected item-total correlation was above 0.30.

**Conclusion** According to the study results, the Persian version of FaMM has acceptable validity and reliability. Therefore, this tool can evaluate the management of families with a child with a chronic disease.

**Keywords** Family Management Measure; Validity and Reliability; Surveys and Questionnaires

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## Introduction

Childhood chronic disease is rising dramatically throughout the world [1]. Epidemiological studies estimate that one-third of under-18-year children suffer from one or more disorders or chronic diseases [2]. In the United States, one in five children has a chronic illness [3]. There are no exact statistics on children with chronic disorders in Iran, but 84 to 114 children per one million with cancer, and 5.8% of Iranian children have asthma [4]. Chronic diseases in children have consequences for individuals and their families [2]. In general, chronic disease during childhood or adolescence affects the patient's existential dimensions and involves various aspects of his/her life. The disease may affect social participation, education, sports exercises, leisure time, relationships with family members, social groups, and, in general, the child's interpersonal relationships [5]. Disease in the family is also perceived as a stressful condition that changes many aspects of the child's life and the family. Chronic diseases change the roles of family members, the general lifestyle, and sometimes even their values and norms [6]. Families respond and manage in various ways when facing the challenge of childhood chronic diseases [7]. Managing each chronic disease during childhood and adolescence is a significant challenge for the family [8]. In the meantime, if nurses consider the family as the main unit for caring for children with chronic disease, they should have a comprehensive understanding of how the family treats child care and family life management. Without such knowledge, the efforts of nurses will be limited to directing and supporting individuals and families in the context of chronic diseases [1]. In a study using MacMaster Family Assessment Device (FAD), Madanloo *et al.* assessed families with children with cancer. The results showed that most of the problems were in the problem-solving dimension, and almost half of the families had unhealthy general functioning [9].

In all research projects, what is essential in collecting data is selecting a research tool [10]. Researchers will be incapable of conducting appropriate scientific research without relying on an appropriate and scientific tool. Therefore, proper measurement tools seem essential for the validity and reliability of research [10]. Family management measure (FaMM) is a valid and reliable tool to identify family management in childhood chronic diseases. This tool was first psychometrically analyzed by Knafl *et al.* The results showed the desirable validity and reliability of the tool [11]. The authors stated that this tool could identify the different dimensions and aspects of the family response to childhood chronic diseases. Later, this tool was used by Hutton *et al.* [12], Kim & Im [13], Ichikawa *et al.* [5], and Bousso *et al.* [14] in Australia, Korea, and Brazil, whose results indicate proper

cultural adaptation, good validity, and reliability of the tool in the context of these countries. Determining the construct validity is necessary for validating the theoretical body by which the tool has been created and verifying that all the item of the scales measures one trait [10].

Regarding the importance of family management in childhood chronic diseases and the lack of sufficient assessment of psychometric properties of the family management measurement (FaMM) in Iran, the present study aimed to determine the construct, convergent validity, and internal consistency of Family Management Measure.

## Instrument and Methods

This descriptive study was carried out in Tehran city using a methodologic design in 2017. All mothers of children with chronic diseases participated referred to outpatient departments of two pediatric educational hospitals affiliated to Shahid Beheshti University of Medical Sciences, Tehran University of Medical Sciences, and the Thalassemia Association, Iran. To determine the number of samples for the confirmatory factor analysis, the rule of 300 samples was used, suggesting that, in any case, the minimum sample size is 300; this number of samples is acceptable according to the law of the sample ratio to the variable. Some researchers suggested the 1:3 ratios to 1:6 ratios, or 3:6, and in any case, the sample size must not be less than 250 [15]. In this regard, in the present study, 300 samples were selected by a convenient sampling method. The inclusion criteria had to speak Persian and respond to the research tools' questions (at least reading and writing skills). The children should have been between 1 and 18 years old, and a specialist physician should have documented a chronic disease diagnosis. At least six months had passed since the diagnosis of the disease in the child. In the last two months, their child was not admitted to the hospital and was not in the disease intensity stage, and had no significant developmental disorder. Their child was diagnosed with one of the chronic physical diseases (Genetic: thalassemia, hemophilia, and cystic fibrosis; Cardio-pulmonary: congenital heart disease, asthma; Metabolic: diabetes; and Chronic kidney disease (CKD)). Only one of the children of mothers was suffering from a chronic disease. The child's main caregiver was father, mother, or both, and none of their children had died of chronic disease. Since the FaMM focuses on the daily management of a child's disease and does not focus on early adaptation or management in crisis, the parents of children who were admitted to hospital in the past two months or were at the disease intensity stage or less than six months of diagnosis excluded from the study. Other exclusion criteria were the participation of the father in the study without his wife (according to the designer of FaMM) and the

failure to answer 70% of the items of the tool.

The study's tools were included a researcher-made questionnaire on demographic and clinical characteristics, with eleven questions in two parts: mother-related questions and questions related to a child with chronic disease, FaMM, and The General Functioning Scale of the McMaster Family Assessment Device (FAD), which included.

- The General Functioning Scale of FAD is derived from McMaster's Family Assessment Device. Family functioning scales are not segregated in the FAD, but in the guidelines for calculating scores, items 1, 6, 11, 16, 21, 26, 31, 36, 41, 46, 51, and 56 are in the general functioning scale. Responses include four options: strongly agree, agree, disagree, and strongly disagree, with scores 1 through 4, respectively. The score of this scale will be between one (healthy) and four (unhealthy). Equal points and above two represent a disruption to family general functioning [16]. The qualitative content analysis of the FAD was assessed. In this way, the questionnaire was provided to 10 nursing faculty members, and they assessed the ambiguous grammar and wording of the items. No item needs edition. Also, the internal consistency of The General Functioning Scale of FAD was assessed by calculating the alpha Cronbach's coefficient (0.9).

- The FaMM consists of two parts and 53 items in six scales; the child's daily life (5 items), the condition management ability (12 items), the condition management effort (4 items), the family life difficulty (14 items), the view of condition impact (10 items) and the parental mutuality (8 items). All parents can answer items in the first part (scales of the child's daily life, Condition Management Ability, Condition Management Effort, Family Life Difficulty, and the View of Condition Impact). The items of the second part (the Parental Mutuality scale) are answered only by parents who live with their spouses. Item scoring is based on the 5-point Likert scale: strongly disagree, disagree, no idea, agree, and strongly agree with 1 through 5 scores. Items 5, 12, 16, 17, 20, 21, 23, 26, 27, 28, 32, 34, 38, 40, 44, 47, 49 and 52 are scored upside down and the other phrases are scored directly. This tool is scored in a way that initially, the number of items with valid responses (ranging from one to five) is determined (at least 70% of the items must have valid answers; otherwise, that scale will be deleted). Then, the answers to negative items are scored upside down by subtracting the number six. Subsequently, the responses of positive and negative items (which have been scored upside down) are added and divided by the number of items with valid answers and multiplied by the total number of items of that scale. It should be noted that the scores of the scales are not added together, so the tool does not have a total score. Higher scores in the three scales of the child's daily life, the Condition Management Ability,

and the Parental Mutuality indicate more ease in disease management. On the other hand, obtaining higher scores in the Condition Management Effort, the Family Life Difficulty, and the View of Condition Impact indicate greater difficulty managing the disease [11]. The validity and reliability of this tool have been confirmed in various studies [7, 11]. In Iran, the results of translation and preliminary psychometrics of FaMM were reported by Mehmanavazan *et al.* They evaluated qualitative and quantitative face and content validity, reliability, and internal consistency of FaMM. The content validity ratio (CVR), item, and scale content validity index (CVI) were assessed for the quantitative content validity. The reliability was assessed by the test-retest method, and for internal consistency, Cronbach's alpha coefficient was calculated. All the items had CVR and Item-CVI greater than the predefined cut-off (0.49 and 0.79, respectively). The intra-class correlation coefficients (ICC) were between 0.71 to 0.94, and the Cronbach's alpha coefficient of subscales was between 0.55 and 0.87 [17].

The present study was approved by Shahid Beheshti University of Medical Sciences. All procedures performed in studies involving human participants were under the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual samples included in the study. They were also ensured that they could withdraw from the research whenever they wished. By referring the researcher to the outpatient wards of hospitals and associations, participants were asked to ensure that all questions were answered upon completion. Response time to the tools took an average of 30 minutes.

The construct and convergent validity, the internal consistency of the scales, and corrected item-total correlation of FaMM were assessed. Construct validity of the instrument was assessed via Confirmatory Factor Analysis (CFA), and Lisrel 8.8 was used. For convergent validity assessment, the correlation of scales FaMM with The General Functioning Scale of FAD was measured by calculating the Pearson correlation coefficient using SPSS 24. The internal consistency was assessed by calculating Cronbach's alpha, and the corrected item-total correlation of all items was reported by SPSS 24. The acceptable value of Cronbach's alpha coefficient was 0.7 [18].

## Findings

The samples' demographic characteristics showed that 45.4% of the samples were in the 35-44 years age group, with a mean of  $37.1 \pm 7.8$  years. Other demographic and clinical characteristics of samples were presented in Table 1. In some cases, questions

did not answer by participants, therefore the sum of numbers is not equal to 300.

**Table 1)** Demographic and clinical characteristics of the research samples' child (n=300)

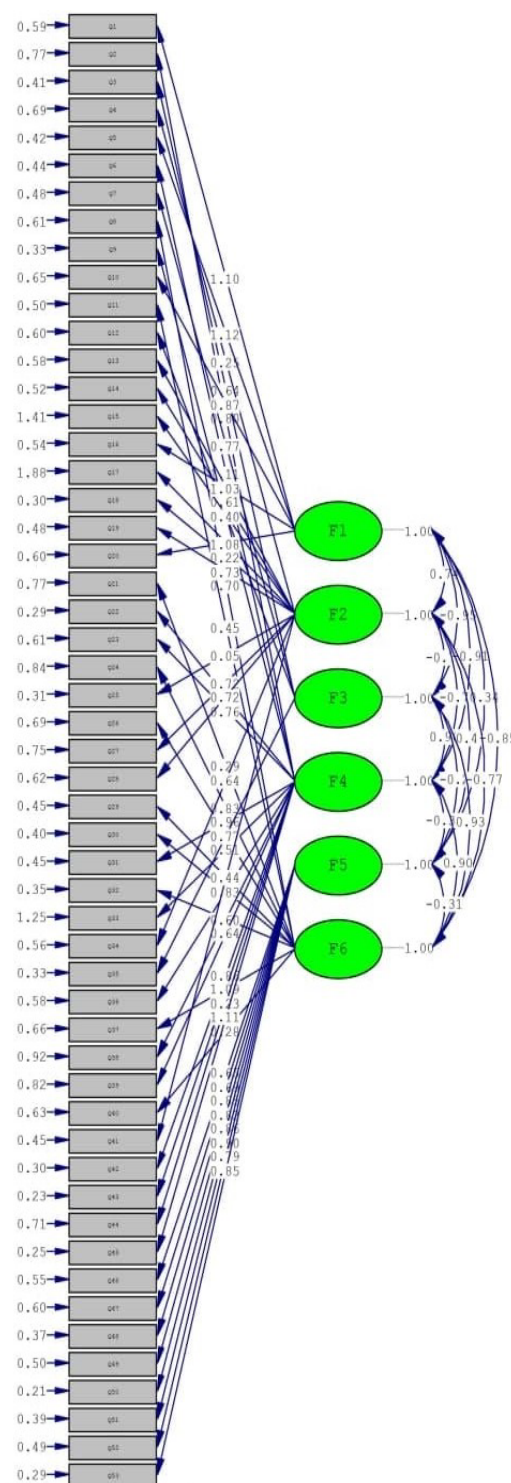
Variable	Variable classes	N (%)
Number of children in the family	≤3	278 (92.7)
	≥4	22 (7.3)
Chronic Disease	Yes	41 (13.7)
	No	259 (86.3)
Family type	Nuclear Family	265 (88.3)
	single-parent family	20 (6.7)
	extended family	15 (5)
Sex of child	boy	205 (68.3)
	girl	95 (31.7)
Education level of child	Elementary school	106 (56.4)
	guidance school	30 (16)
	High school	52 (27.6)
Type of disease	Thalassemia	119 (39.7)
	Cystic Fibrosis	44 (14.7)
	CKD	42 (14)
	Hemophilia	33 (11)
	Asthma	26 (8.7)
	Congenital Heart Disease	22 (7.3)
	Diabetes	14 (4.6)
The duration of chronic disease (month)	<12	10 (3.3)
	12-72	100 (33.3)
	72-144	106 (35.3)
	144-192	43 (14.4)
	≥192	41 (13.7)
Number of hospitalizations	0	42 (17)
	1-9	166 (67.2)
	≥10	39 (15.8)
Birthday rating	the first child	131 (43.7)
	The Second child and above	169 (56.3)
The main caregivers	father	6 (2)
	mother	95 (31.7)
	both parents	199 (66.3)

The confirmatory factor analysis results showed that the model of the six factors of the tool had relatively good indices (Table 2; Figure 1).

The FAD was negatively correlated with the scales of easiness of family management (child's daily life, condition management ability, and the parental mutuality), and it had a positive correlation with the scales of the difficulty in managing the disease and the family (condition management effort, family life difficulty and the view of condition impact). In this way, the convergent validity of the FaMM was confirmed (Table 3).

**Table 2)** The model fit indices in confirmatory factor analysis

The goodness of Fit Index	0.70
Comparative Fit Index	0.96
Adjusted Goodness of Fit Index	0.73
Normed Fit Index	0.94
Non-Normed Fit Index	0.96
Relative $\chi^2$	2.58
$\chi^2$	3386.44
Root Mean Square Error of Approximation	0.073
P-value	0.00
df	13.10



**Figure 1)** Model of confirmatory factor analysis

**Table 3)** The indices of convergent validity of FaMM

FaMM scales	FAD Pearson's r	p-value
Child's daily life	-0.293	<0.001
Condition Management Ability	-0.379	<0.001
Parental Mutuality	-0.621	<0.001
Condition Management Effort	0.255	<0.001
Family Life Difficulty	0.401	<0.001
View of Condition Impact	0.358	<0.001

All scales had Cronbach's alpha above 0.7. Three items in the scale of the Condition Management Ability, one item in the scale of the Family Life Difficulty, and two items on the View of Condition Impact scale had corrected item-total correlation less than 0.30. However, since the deletion of these items did not change the Cronbach alpha value of the related scales, none of them were deleted. The average of scales representing the easiness in family management (The child's daily life, The Condition Management Ability, and the Parental Mutuality) as well as the scales of the difficulty in managing the disease and the family (The Condition Management Effort, The Family Life Difficulty and The View of Condition Impact) were relatively high (Table 4).

**Table 4)** The mean and standard deviation of scales scores and final Cronbach alpha coefficient of FMM scales (n=300)

Scales	Mean±SD	The range of scores	Cronbach's alpha
Child's daily life	13.70±5.50	5-25	0.90
Condition Management Ability	42.80±6.60	23-59	0.78
Parental Mutuality	29.50±6.70	9-40	0.92
Condition Management Effort	15.40±3.40	5-20	0.84
Family Life Difficulty	45.90±12.00	16-68	0.94
View of Condition Impact	31.20±5.60	11-43	0.79

## Discussion

This study aimed to determine the psychometric properties of the FaMM. The results showed that the instrument was reliable and valid in Iranian society. In the present study, CFA indices represent a good fit of the model [15]. Kim and Im analyzed psychometric properties of FaMM on 341 caregivers (parents, grandmother, and grandfather) of children with chronic disease, fit indices in their study were NFI=0.90, GFI=0.91, AGFI=0.90, RMR=0.04, and NNFI=0.92 [13] which the goodness of fit index, adjusted goodness of fit index was higher than those in the present study, and normed fit index and non-normed fit index were lower than those in the present study. The above study's higher GFI and AGFI indices can be attributed to the present study's statistical population and different samples. The present study was conducted only on mothers of children with a wide range of chronic diseases. Bousso *et al.* aimed to validate FaMM in Brazilian culture on 262 relatives of children and adolescents suffering from chronic disease used exploratory factor analysis to evaluate the construct validity, which resulted in eight scales [14].

On the other hand, they reported the Tucker-Lewis index and root mean error square of approximation based on a theoretical model as TLT=0.8728 and RMSEA=0.0403, respectively [14]. The root means error square of approximation was lower and therefore more favorable than that in the present study, which can be attributed to the statistical society and the different FMM scales in the two

studies. Further research in this field seems to be necessary.

In the present study, FaMM and FAD scales, convergent validity indicates a significant correlation between FaMM and FAD scales which confirmed the convergent validity of FaMM. Of course, correlations should not be very strong in convergent validity, but moderate correlations are preferred. The very high correlation coefficient indicates that the new tool does not provide new information in addition to what the previous tests provide to us [15]. Little correlation between the FMM and The General Functioning Scale of (FAD) scales provide evidence that this new tool addresses aspects of the family response to a child's chronic disease, which is distinct from the overall family function, and the usefulness of this tool is supported in targeting aspects of family life that are specifically related to disease management [7]. Knafl *et al.* also used convergent validity in the accreditation of the original version of FMM. In their study, convergent validity was confirmed by a significant correlation between FaMM and The General Functioning Scale of (FAD), Eyberg Child Behavior Inventory (ECBI), and Functional Status Measure II (FSM-II). In their study, the correlation coefficient between The General Functioning Scale of (FAD) and the FMM scales was close to the present study, with  $r=-0.21$  for the child's daily life,  $r=-0.35$  for the condition management ability,  $r=-0.64$  for parental interaction,  $r=0.16$  for the condition management effort,  $r=0.38$  for the family life difficulty and  $r=0.22$  for the view of condition impact [11].

In this study, the internal consistency of the tool was assessed by calculating Cronbach's desirable alpha. Knafl *et al.* reported Cronbach's alpha for all scales of the original version of FMM ranging from 0.72 to 0.90 for mothers and from 0.73 to 0.91 for fathers of children with chronic disease [11]. Van Riper *et al.* also reported the Cronbach's alpha value of FMM scales ranging from 0.71 to 0.92 for mothers and from 0.68 to 0.92 for fathers of children with Down syndrome [19]. In the study of Bousso *et al.*, Cronbach's alpha values of child's daily life, the condition management ability, condition management effort, family life difficulty, the view of condition impact, and the parental mutuality were  $\alpha=0.78$ ,  $\alpha=0.55$ ,  $\alpha=0.51$ ,  $\alpha=0.86$ ,  $\alpha=0.56$ ,  $\alpha=0.80$ , respectively [14], which are lower than those in the present study which can be attributed to small sample size and different statistical populations compared to the present study. The results of Kim and Im show the internal consistency of the Korean version of FMM with Cronbach's alpha  $\alpha=0.79$ ,  $\alpha=0.74$ ,  $\alpha=0.69$ ,  $\alpha=0.91$ ,  $\alpha=0.71$  and  $\alpha=0.89$  in the child's daily life, condition management ability, condition management effort, the family life difficulty, the view of condition impact and the parental mutuality [13]. Cronbach's alpha coefficient of the condition management effort in their study is



lower than that in the present study. In general, from the results of the mentioned studies, the conclusion is that FMM is a reliable tool in various societies and can be used on various samples. In the present study, the corrected item-total correlation coefficient of all items was calculated. Considering that the deletion of each of these items did not affect the total alpha coefficient of the relevant scales, none of them were deleted. No corrected item-total correlation coefficient has been reported in similar studies [5, 11, 13, 14]. Further research in this field seems to be necessary. One of the limitations of this study was the sampling of the mothers due to the absence of the father at the bedside of the sick child or his presence without the mother's presence. Since the study was conducted only on mothers, the results cannot be generalized to fathers of children with chronic diseases. On the other hand, the limited number of research settings was another constraint of the present study, which could doubt the sample representativeness. Also, the convenient sampling method was another limitation of this study. It is recommended to use the translated to Persian version of FaMM in epidemiologic and clinical family studies.

## Conclusion

The Persian version of FaMM has acceptable construct and convergent, internal consistency, and reliability. The model fit indices are relatively acceptable. Therefore, this tool can be helpful in studies related to managing families with children with chronic diseases, assessing the current situation, and evaluating the effectiveness of interventions to change this management.

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**Ethical Permissions:** The present study is a part of an M.S thesis approved by Shahid Beheshti University of Medical Sciences with the ethics code IR.SBMU.PHNM.1395.401.

**Conflicts of Interests:** Here, the authors declare no conflicts of interest in the present research.

**Authors' Contribution:** Mehmannaavazan F (First Author), Introduction Writer/Main Researcher (30%); Hosseini M (Second Author), Methodologist/Discussion Writer (20%); Hejazi SS (Third Author), Assistant Researcher/Methodologist (20%); Vartanoosian J (Fourth Author), Assistant Researcher/Discussion Writer (10%); Matbouei M (Fifth Author), Assistant Researcher/Discussion Writer (10%); Nasiri M (Sixth Author), Methodologist/Statistical Analyst (10%).

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