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# The Family Management of Childhood Chronic Conditions: Measurement in a Turkish Sample

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ABSTRACT

*Purpose:* The principal aim of this study was to adapt the FaMM into the Turkish language and test its validity and reliability.
*Design and methods:* Data were collected from a total of 395 parents of children with chronic disease. The FaMM was translated using the translation and back-translation method. The reliability analysis of the FaMM was performed using Cronbach alpha coefficients, item-total correlations and test-retest correlations. Construct validity for the scale was assessed with confirmatory factor analysis (CFA) and exploratory factor analysis (EFA).
*Results:* The overall content validity index was 95%, signifying that the FaMM has good content validity. The CFA of the Turkish version of the FaMM did not confirm the original factorial structure. The model of three subscales for the Turkish FaMM was validated using EFA. The values of ≥0.70 for the Cronbach alpha coefficient, >0.25 for the item-total correlations and >0.40 for the test-retest application correlations for 2 weeks were found to be acceptable levels for the instruments and its subscales.
*Conclusions:* The FaMM was found to be valid, reliable and appropriate for Turkish culture and psychometric characteristics were satisfactory.
*Practice implications:* The FaMM can be used in evaluating the management of illness in families with children with chronic disease.



## Introduction

Chronic illnesses are on the rise today and constitute a public health issue that affects a substantial segment of the population. In the literature, rates of childhood chronic illnesses are reported as varying between 12%–18% (Van Dyck, Kogan, McPherson, Weissman, & Newacheck, 2004; Zhong et al., 2015). Although there is no nationwide study in Turkey that reveals the prevalence of chronic illnesses among children and adolescents, it is estimated that the rate of children with chronic illness is between 10%–15% (Çavuşoğlu, 2013; Mutlu & Balcı, 2010). When children are diagnosed with chronic conditions, they and their families face various challenges and generally need help from healthcare professionals in their efforts to manage the illness (Knafl et al., 2011). Besides the medical issues involving treatment and care in this period, scant economic resources, problems with the child's performance at school, anxieties about the future, changes in the family's lifestyle and breakdowns in social relations are some of the problems encountered (Erdem et al., 2013). The daily life of both the child and the family functions normally to the extent that the family can manage the illness and cope with the difficulties experienced. The inclusion of illness management in a family's life in fact requires setting a balance between the efforts to manage the chronic condition and holding on to expectations from life and making plans for the future. It is when this balance is achieved that the illness can be best managed (Knafl, Deatrick, & Havill, 2012). Introducing the management of a chronic illness into the mechanisms of family life and making this a natural part of daily existence can only be made possible by the collaborative efforts of the child and parents to identify the requirements of care, develop strategies for the management of the illness, set up routines and assess the possible future impacts of the illness. Additionally, the family must adopt an approach to management and care that incorporates cooperative efforts that will provide optimum quality of life (Knafl et al., 2012; Knafl & Deatrick, 2003).

The healthcare services related to chronic issues are usually provided by nurses and are family-or problem-oriented. Researchers have shown in studies that family conflicts, problems with cohesion, family reactions and other variables such as a family's demographic characteristics are closely associated with the adaptation of a child to the illness and its management outcomes (Alderfer et al., 2008; Graf, Landolt, Mori, & Boltshauser, 2006; Knafl et al., 2012). Moreover, it is reported

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that family-focused management has a more positive impact on caregiver, child, and family functions outcomes compared to condition-focused management (Knafl et al., 2013). Consequently, it is recommended that interventions to support management of childhood conditions be family-based (Knafl et al., 2012; Zhang, Wei, Han, Zhang, & Shen, 2013).

Nurses constitute one of the most influential healthcare professions that can guide families in the management of chronic illness (Bahar, 2010; Seçginli, Erdoğan, & Demirezen, 2004). Nurses are able to evaluate the degree to which a family is able to cope with an illness in the problem-solving process and may apply appropriate interventions to strengthen the family's coping mechanisms (Bahar, 2010; Seçginli et al., 2004). There are many theories and conceptual models that aid the nurse in understanding chronic disease and related functional needs. There are models suggested in the literature addressing the difficulties children face (such as Leventhal's self-regulation model) and the challenges parents encounter (such as Copley and Bodensteiner's time-bound model, Olshansky's chronic sorrow model and John Rolland's Family Systems-illness model) (Kudubeş & Bektaş, 2015). The "Family Management Style Framework (FMSF)" is a model that considers both the child and the family as an integrated whole in the management of a child's chronic illness (Knafl et al., 2012; Knafl & Deatrick, 2003). The model is based on balancing illness management with life expectations and future plans (Knafl et al., 2013).

The FMSF is used to identify the efforts of caregivers to include management of the illness in their daily lives and in this context, the family's strengths, challenges and the difficulties they experience are defined in order to decide upon the interventions that must be made. The model is employed in terms of three aspects of illness management: definition of the situation, management behaviors, and consequences. The interventions that can be applied following the definition of the situation can be determined in a way that will address all the needs of the family, the caregiver and the child (Beeber & Zimmerman, 2012; Jang & Whittemore, 2015; Rempel, Blythe, Rogers, & Ravindran, 2012). Becoming conscious of the management style of a family allows an identification and therefore an understanding of the family's strengths and weaknesses (Knafl & Deatrick, 2003; Knafl, Deatrick & Gallo, 2008; Knafl et al., 2013).

The Family Management Measure (FaMM) makes it possible to assess the difficulties encountered in management, as well as improvements and changes occurring. It is an instrument developed based on the FMSF. The FaMM is a valid and reliable instrument that was developed after comprehensive qualitative and framework studies (Knafl et al., 2011; Knafl et al., 2012; Knafl et al., 2013; Knafl & Deatrick, 2003; Zhang et al., 2013). Many studies have employed the instrument and proved its validity (Bousso et al., 2017; Ichikawa et al., 2014; Kim & Im, 2013). It has moreover been used in numerous studies in clinical and community health fields (Deatrick et al., 2018; Estrem, Thoyre, Knafl, Frisk Pados, & Van Riper, 2018; Hutton, Munt, Aylmer, & Deatrick, 2012; Knafl et al., 2013). By making use of FaMM, nurses are able to accurately identify the challenges and needs related to the management of chronic disease and evaluate the effectiveness of the care provided. No study could be found in the Turkish literature on a valid and reliable tool to assess the management of illness among families having children with a chronic disease.

The aim of the present study was to adapt FaMM to Turkish, test its validity and reliability and make comparisons using sociodemographic variables.

## Method

### *Study design*

This study was of methodological research design. Permission was obtained from Knafl via email for the adaptation of FaMM into Turkish. Prior to the start of the study, permission was also obtained from the institutions and the local ethics committee of the university concerned.

### *Participants*

The study was carried out in 12 schools located in three districts of Istanbul. These schools were situated in areas of different socioeconomic levels. Since the recommendation was that the adaptation and the validity testing of the scale be performed with 5–10 times the number of items and, if confirmatory factor analysis was to be applied, a total of 300–500 individuals (Şencan, 2005; Sousa & Rojjanasrirat, 2011), it was planned that the 53-item FaMM would have to reach a participating group that was at least 5 times the number of items, which was 265.

The parents of the 505 children at the schools who had been identified as having chronic health issues filled out and returned the data collection questionnaires. Of these, 110 questionnaires had missing items on the FaMM. The forms with missing data were examined. Any missing data under more than one factor were excluded from the analysis of the data. For example, if a question was left blank under a factor, the form it belonged to was not included in the analysis. Demographic characteristics appearing on both incomplete and complete questionnaires were similar (Table 1). Questionnaires with sections that had been left incomplete by the parents were excluded from the psychometric analysis. The research was completed with 395 families.

Parents submitted a single questionnaire which had been filled out by the mother, father or the parents together. Of the questionnaires, 63.1% were filled out by mothers, 7.5% by fathers and 29.5% by the two parents together. The retest was conducted with 10.0% (40 parents) of the sample.

### *Instrument*

The study data were collected with the Child-Family Questionnaire and the FaMM.

### *Child-family questionnaire*

The form consisted of 8 questions that probed into sociodemographic characteristics and determining the presence of diagnosed chronic illnesses.

### *The Family Management Measure (FaMM)*

Knafl et al. (2011) developed this 53-item five-point Likert-type scale. Each item on the scale is rated between 1 and 5. The scale comprises six subscales that are identified as Child's Daily Life, Condition Management Ability, Condition Management Effort, Family Life Difficulty, View of Condition Impact, and Parental Mutuality; its Cronbach alpha value is in the range of 0.72–0.91 and its test-retest reliability varies between 0.71 and 0.94. Each of the six subscales can be used as separate scales (Knafl et al., 2011).

### *Phases of the study*

The study had five phases. The first phase was the language adaptation in which the FaMM was translated using the translation and back-translation methods. In the second phase, experts provided input regarding the content validity of the measure. The other stages of the study consisted of pilot testing, procedure and psychometric testing.

### *Phase 1: language adaptation*

Two individuals, native Turkish speakers and fluent in English, were independently asked to translate the scale from English into Turkish. The researchers then assessed the translations and reached a consensus on the wording of the items. The back-translation of the translation was later carried out by two other independent experts. The back-translated

**Table 1**
Demographic variables ($N = 505$).

| Variables | Total | | Complete[a] ($n = 395$) | | Incomplete[b] ($n = 110$) | | Statistic | |
|---|---|---|---|---|---|---|---|---|
| | *n* | % | *n* | % | *n* | % | $\chi^2$ | *p* |
| Children's gender ($n = 505$) | | | | | | | | |
| Girl | 287 | 56.8 | 219 | 55.4 | 68 | 61.8 | 1.4 | .276 |
| Boy | 218 | 43.2 | 176 | 44.6 | 42 | 38.2 | | |
| Children's age ($n = 504$) (mean = 10.95. SD = 2.54) | | | | | | | | |
| 6–10 | 221 | 43.8 | 182 | 46.1 | 39 | 35.8 | 3.6 | .159 |
| 11–14 | 238 | 47.2 | 179 | 45.3 | 59 | 54.1 | | |
| 15–18 | 45 | 8.9 | 34 | 8.6 | 11 | 10.1 | | |
| Chronic conditions ($n = 505$) | | | | | | | | |
| Asthma | 316 | 62.6 | 243 | 61.5 | 73 | 66.4 | 5.7 | .887 |
| Heart defect | 31 | 6.1 | 27 | 6.8 | 4 | 3.6 | | |
| Allergy/allergic rhinitis | 27 | 5.3 | 22 | 5.6 | 5 | 4.5 | | |
| Anaemia | 19 | 3.8 | 16 | 4.1 | 3 | 2.7 | | |
| Musculoskeletal problems | 16 | 3.2 | 12 | 3.0 | 4 | 3.6 | | |
| Type 1 diabetes | 12 | 2.4 | 11 | 2.8 | 1 | 0.9 | | |
| Epilepsy | 14 | 2.8 | 11 | 2.8 | 3 | 2.7 | | |
| Psychological problems | 13 | 2.6 | 9 | 2.3 | 4 | 3.6 | | |
| Renal diseases | 10 | 2.0 | 8 | 2.0 | 2 | 1.8 | | |
| Attention deficit hyperactivity disorder | 9 | 1.8 | 8 | 2.0 | 1 | 0.9 | | |
| Stomach diseases | 6 | 1.2 | 5 | 1.3 | 1 | 0.9 | | |
| Other | 32 | 6.3 | 23 | 5.8 | 9 | 8.2 | | |
| Child's state of health ($n = 505$) | | | | | | | | |
| Excellent | 11 | 2.2 | 9 | 2.3 | 2 | 1.8 | 6.3 | .178 |
| Very good | 67 | 13.5 | 47 | 12.2 | 20 | 18.2 | | |
| Good | 262 | 52.9 | 208 | 54.0 | 54 | 49.1 | | |
| Fair | 152 | 30.7 | 120 | 31.2 | 32 | 29.1 | | |
| Poor | 3 | 0.6 | 1 | 0.3 | 2 | 1.8 | | |
| Mother's education status ($n = 501$) | | | | | | | | |
| Elementary | 210 | 41.9 | 159 | 40.6 | 51 | 46.8 | 2.6 | .457 |
| Secondary | 60 | 12.0 | 47 | 12.0 | 13 | 11.9 | | |
| High school | 148 | 29.5 | 116 | 29.6 | 32 | 29.4 | | |
| College | 83 | 16.6 | 70 | 17.9 | 13 | 11.9 | | |
| Father's education status ($n = 496$) | | | | | | | | |
| Elementary | 123 | 24.4 | 95 | 24.4 | 28 | 26.4 | 1.5 | .676 |
| Secondary | 91 | 18.0 | 69 | 17.7 | 22 | 20.8 | | |
| High school | 169 | 33.5 | 138 | 35.4 | 31 | 29.2 | | |
| College | 113 | 22.4 | 88 | 22.6 | 25 | 23.6 | | |
| Family type ($n = 502$) | | | | | | | | |
| Nuclear family | 434 | 85.9 | 334 | 85.0 | 100 | 91.7 | 3.8 | .149 |
| Extended family | 29 | 5.7 | 35 | 8.9 | 4 | 3.7 | | |
| Single parent family | 39 | 7.7 | 24 | 6.1 | 5 | 4.6 | | |
| Economic status ($n = 499$) | | | | | | | | |
| Low | 128 | 25.3 | 106 | 27.2 | 22 | 20.2 | 2.5 | .274 |
| Medium | 278 | 55.0 | 215 | 55.1 | 63 | 57.8 | | |
| Good | 93 | 18.4 | 69 | 17.7 | 24 | 22.0 | | |

[a] Validity and reliability analyses were performed for this group.
[b] This dataset has missing items on the FaMM.

and original forms of FaMM were matched by researchers and found to be highly similar in meaning.

*Phase 2: content validity*

The opinions of nine experts (one associate professor in public health, one associate professor internal medicine nursing, two professors in fundamental nursing, two professors in pediatric nursing, three associate professor in public health nursing) were obtained to assess content validity of the Turkish FaMM. Five of the experts were parents of a child with a chronic illness (asthma, autism, diabetes, allergies, hyperactivity) and the other four had clinical experience working with children with chronic problems and their families. The experts were asked to rate each item based on a 4-point scale, evaluating each for relevance to the Turkish culture (responses 1–4 with a score of 4 demonstrating high relevance), clarity (responses 1–4 with a score of 4 showing high clarity) and comprehensiveness (responses 1–4 with a score of 4 showing high comprehensiveness), and providing a recommendation, if any.

*Phase 3: pilot test*

The pilot test was conducted with 10 families who had children with a chronic illness. The children were identified with the following diagnoses on the pilot test: Asthma ($n = 3$), heart defect ($n = 1$), diabetes ($n = 1$), allergies ($n = 3$), hyperactivity ($n = 2$). The families were asked about the clarity and comprehensibility of the items.

*Phase 4: procedure*

The children were identified as having a chronic illness in two different ways. Lists were obtained from the schools that kept health records. At schools that did not maintain health records, the identification of children with chronic health issues was made with the help of the school administration and classroom teachers. The criteria for inclusion in the study were having been diagnosed with a chronic illness at least 6 months before the study and not having been hospitalized in the last two months. Later, the informed consent forms sent home to the families of the students who matched the study criteria. The data collected from the families were based on self-reporting. The students took the scales home with them and were asked to bring them back the next day. The data collection continued however for a period of two weeks as not all of the forms could be collected on the next day.

The retest was conducted 2 weeks after the initial implementation (Streiner, Norman, & Cairney, 2015).

*Phase 5: psychometric tests*

The content validity of the scale in the data analysis was examined with Kendall's W Analysis and the content validity index (CVI).

After the completion of the content validity analysis, we first performed a confirmatory factor analysis to determine to what degree the 6-dimensional model theoretically proposed fit the data obtained from the Turkish version of the FaMM. Following this, the confirmatory factor analyses were tested, first in terms of the theoretical, then for alternative models. Since the item scores represented rank ordered variables, the CFA was performed in the Lisrel 8.80 package program using the diagonally-weighted least squares (DWLS) estimation approach for asymptotic covariance. In the confirmatory factor analysis, multiple fit indexes were used: the chi-square test, goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), standardized root mean square residual (SRMR) and root mean square error of approximation (RMSEA) fit indices.

Because the CFA fitness indices did not confirm the structure of the original measure, we then performed an exploratory factor analysis (EFA) to find a clustering of items appropriate to our culture. The EFA was preferred because the item-factor correlations that had been foreseen were not consistent and the need arose to look into alternative factors and correlations. Factor analysis using Maximum Likelihood estimation and the Varimax Rotation methods was carried out.

The reliability was evaluated according to scale and item analysis, internal consistency and stability (test-retest). The Cronbach's Alpha Coefficient was employed to assess the internal consistency of the scale and its subscales. Pearson's Correlation Analysis was used to determine item-total correlations and test-retest reliability.

## Results

*Participants*

Of the students ($N = 505$), 56.8% were girls, 43.2% were boys and the mean age was 10.95 (SD = 2.54) years. Among the children with chronic issues, 62.6% had asthma, 6.1% had a heart defect, and 5.3% were reported having allergic rhinitis and other allergic conditions. Of the parents, 52.9% described their children's health condition as good (Table 1).

*Content validity*

After the opinions of the experts were obtained for content validity, changes were made in some of the words contained in items 2, 6, 16 and 17. The word "condition" was replaced by "illness" in the items. While this was being done, care was taken to ensure that the original form and meaning of the scale was not altered. The experts had no further comments on the questions. Kendall's W analysis revealed that there were no differences between the opinions of the experts (Kendall's W = 0.183. $p = .19$). Relevance at the item level produced a mean result of 3.85 out of 4.00, clarity was 3.92 and comprehensiveness was 3.91. The overall content validity index (CVI) was 95%, which signified that the FaMM had good content validity.

*Pilot test*

Following the pilot test that was carried out with 10 families having children with chronic illness, revisions were made in items 25 and 41, with care given to preserving the meaning of the sentence. A review of the item analysis determined that the item-total correlation in all items was above 0.20 and that the Cronbach alpha value of the 53-item scale was 0.82.

*Confirmatory factor analysis*

Confirmatory factor analysis was used to determine to what degree the 6-dimensional model theoretically proposed fit the data obtained from the Turkish version of the FaMM. It was seen that the general fit index coefficients of the theoretical model were $\chi^2_{1310} = 7585.13$. $p = .00$. It was observed that CFI = 0.87; RMSEA 0.11 and SRMR = 0.14 and unacceptable (Table 2). The covariation of errors between the indicators in models 1, 2 and 3 based on the modification indices was added and the improvement in the general fit coefficients of the models was reviewed. Although $\chi^2$ there were statistically significant reductions in the difference coefficients, no significant improvement was observed in the CFI, RMSEA and SRMR indices. Independently of this review, CFA was used to explore goodness of fit in an effort to find the source of the lack of fit; this was done by examining each factor in the next stage of the analysis to determine which factor was responsible for the lack of fit. It was finally observed that general fit coefficients were high in the factors of "condition management ability" and "condition management effort" but low in the other factors (Table 2).

*Exploratory factor analysis*

Since the CFA fitness indices did not confirm the construct of the original measure, an exploratory factor analysis (EFA) was performed in order to find a clustering of the items appropriate to our culture in the last stage of the analysis. EFA was performed on the same set of data to find alternative ways of explaining the relationships between the indicators. The eigenvalue graph resulting from the exploratory factor analysis revealed that the Turkish version of the FaMM was three-dimensional. The total variance explained by the three-dimensional structure was 40.08% (Kaiser-Meyer-Olkin (KMO) = 0.89; Bartlett Test of Sphericity $\chi^2_{1378} = 8073.42$. $p = .00$).

Item-factor correlations are shown in Table 3. The factor loads of the items indicated in blue in Table 3 (M3, M14, M32, M24, M27, M12, M5, M2, M47, M10, M21) were found to be below 0.40. The factor loads in parentheses were obtained when these items were removed and the factor analysis was performed again (KMO = 0.90; Bartlett $\chi^2_{861} = 6722.33$. $p = .00$). In the final analysis, the total variance was 45.87. Based on the factor loads of the items and their content, the first dimension was named "Child's Daily Life and Condition Management" (CDLCM), the second "Family Life Difficulty and View of Condition Impact" (FLDVCI), and the third "Parental Mutuality" (PM).

*Reliability*

The item-total correlations of the CDLCM subscale were 0.48–0.77, with a Cronbach alpha value of 0.93; the item-total correlations of the FLDVCI subscale were 0.38–0.69, with a Cronbach alpha of 0.87. The item-total correlations of the PM subscale were 0.38–0.67, with a Cronbach alpha value of 0.84: the total FaMM Cronbach alpha value was found to be 0.86. The test-retest correlations were 0.89 for CDLCM, 0.83 for FLDVCI and 0.73 for PM (Table 4).

## Discussion

This study determined that the Turkish version of FaMM would be composed of 42 items and three subscales. The Cronbach alpha coefficients and item-total correlations for the Turkish FaMM and subscale scores revealed a good level of reliability and the retest results showed consistency. It was found that the Turkish FaMM could be used in evaluating the management of illness in families with children with chronic disease.

*Content validity*

The experts consulted for content validity in the study suggested that the word "illness" be used to replace "condition." To this effect, the heading of the instrument and its sub-dimensions was revised to include the term "chronic illness." We think this revision was useful in increasing the comprehensibility of the questionnaire. In the cultural adaptation of the questionnaire for the Brazilian population, the term "chronic condition" was replaced by "chronic disease" (Ichikawa et al., 2014). The results of the analysis revealed that the scale had high content validity.

*Reliability*

In the calculation of the Cronbach alpha value, one of the most common methods of evaluating reliability, an alpha coefficient of >0.60 signifies modest reliability while >0.70 indicates good reliability (Nunnally, 1978). It has been recommended 0.30 by Cristobal, Flavián,

**Table 2**
General coefficients of fit obtained from the FAMM confirmatory factor analysis.

| Model (error covariance added items) | $\chi^2$ | df | *p* | CFI | RMSEA [90% CI] | SRMR | $\Delta\chi^2$ |
|---|---|---|---|---|---|---|---|
| 1. Theoretical model | 7585.13 | 1310 | .00 | 0.87 | 0.11 [0.11–0.11] | 0.14 | |
| 2. Alternative model 1 (23–35) | 7449.46 | 1309 | .00 | 0.87 | 0.11 [0.11–0.11] | 0.14 | 135.67 |
| 3. Alternative model 2 (23–35; 13–38) | 7290.49 | 1308 | .00 | 0.88 | 0.11 [0.11–0.11] | 0.14 | 158.97 |
| 4. Alternative model 3 (23–35; 13–38; 13–42) | 7185.60 | 1307 | .00 | 0.88 | 0.11 [0.10–0.11] | 0.14 | 104.89 |
| a. Child's daily life | 20.48 | 5 | .00 | 0.98 | 0.09 [0.05–0.13] | 0.04 | |
| b. Condition management ability | 122.72 | 35 | .00 | 0.97 | 0.08 [0.07–0.10] | 0.07 | |
| c. Condition management effort | 0.90 | 2 | .64 | 1.00 | 0.00 [0.00–0.08] | 0.02 | |
| d. Life difficulty | 520.17 | 54 | .00 | 0.88 | 0.15 [0.14–0.16] | 0.12 | |
| e. View of condition impact | 161.31 | 35 | .00 | 0.90 | 0.10 [0.08–0.11] | 0.10 | |
| f. Parental mutuality | 192.64 | 20 | .00 | 0.94 | 0.15 [0.13–0.17] | 0.09 | |

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.

**Table 3**
Factor loads obtained from the FAMM exploratory factor analysis.

| Factor 1 | | Factor 2 | | Factor 3 | |
|---|---|---|---|---|---|
| Items | Factor loads (*) | Items | Factor loads (*) | Items | Factor loads (*) |
| M18 | .86 (.84) | M31 | .71 (.71) | M48 | .77 (.76) |
| M1 | .82 (.81) | M22 | .67 (.67) | M50 | .76 (.78) |
| M20 | .79 (.81) | M23 | .61 (.61) | M53 | .72 (.74) |
| M38 | –.76 (.72) | M30 | .60 (.60) | M46 | .64 (.66) |
| M42 | –.74 (.76) | M36 | .60 (.62) | M51 | .54 (.57) |
| M26 | –.68 (.65) | M37 | .57 (.58) | M40 | –.50 (.50) |
| M52 | .67 (.66) | M35 | .55 (.54) | M49 | .45 (.48) |
| M19 | .66 (.64) | M7 | .54 (.52) | M21 | |
| M13 | .65 (.64) | M11 | .52 (.51) | | |
| M4 | .62 (.63) | M39 | .51 (.49) | | |
| M16 | .62 (.66) | M45 | .51 (.50) | | |
| M43 | –.61 (.63) | M9 | .46 (.43) | | |
| M44 | –.56 (.55) | M29 | .43 (.42) | | |
| M25 | .55 (.49) | M8 | .42 (.41) | | |
| M28 | .55 (.58) | M15 | –.42 (.43) | | |
| M34 | .53 (.56) | M33 | .41 (.41) | | |
| M41 | .49 (.45) | M12 | | | |
| M6 | –.48 (.52) | M5 | | | |
| M17 | .44 (.45) | M2 | | | |
| M3 | | M47 | | | |
| M14 | | M10 | | | |
| M32 | | | | | |
| M24 | | | | | |
| M27 | | | | | |

(*)The factor loads in parentheses were obtained when blue items were removed.

and Guinalíu (2007) for item - total correlations. In the present study, the Cronbach alpha coefficient for FaMM and the subscales was found to be >0.84, while item-total score correlations were >0.38 and test-retest correlation coefficients were >0.73. In the original study, the Cronbach alpha coefficients for FaMM and its subscales had been found to be 0.72–0.91 and the test-retest correlation coefficients to be 0.71–0.94 (Knafl et al., 2011). These results indicate good reliability, similar to the findings of the original study for the Turkish FaMM.

*Confirmatory and exploratory factor analysis*

Hair, Black, Babin, Anderson, and Tatham (2010) report that although $\chi^2$ is statistically significant when the number of items is ≥30 and the number of participants is ≥250, CFI should be >0.90, RMSEA should be <0.07, and SRMR <0.08. Accordingly, in the analysis, it was found that the goodness of fit coefficients of the 4 different models and the 4 subscales were low. This was interpreted to mean that the theoretical factors foreseen were inadequate in explaining the relationships between the indicators. It was later seen with exploratory factor analysis that the Turkish FaMM displayed a three-factorial structure. The scoring instructions for the scale were subsequently revised to match the new factors. In naming the new factors, the original factor names that were dominantly used in the factor were used.

The high score on the CMCDL subscale shows that that the family is more competent in illness management and that the child's daily life is normal. The higher scores on the FLDVCI subscale shows that more problems are being experienced in the management of the illness and that the situation is more serious. The higher scores in the PM subscale shows that the parents are more likely to work together in the management of the illness.

**Table 4**
Psychometric properties of Turkish version of the FAMM (42 items).

| Factors and items | Mean | SD | Item-total r | Test-retest r | α |
|---|---|---|---|---|---|
| **Condition management and child's daily life** | | | | 0.89 | 0.93 |
| 1. Our child's everyday life is similar to that of other children his/her age. | 3.92 | 1.32 | 0.76 | | |
| 2. In the future we expect our child to take care of the condition. | 3.65 | 1.44 | 0.59 | | |
| 3. Taking care of our child's condition is often overwhelming. | 3.31 | 1.48 | 0.46 | | |
| 4. We have some definite ideas about how to help our child live with the condition. | 3.98 | 1.27 | 0.64 | | |
| 5. Our child is different from other children his/her age because of the condition. | 3.82 | 1.41 | 0.61 | | |
| 6. It is difficult to know when our child's condition must come first in the family. | 3.54 | 1.40 | 0.46 | | |
| 7. We are looking forward to a happy future with our child. | 4.35 | 1.17 | 0.77 | | |
| 8. When something unexpected happens with our child's condition. We usually know how to handle it. | 4.04 | 1.23 | 0.65 | | |
| 9. Our child's friendships are different because of the condition. | 3.85 | 1.43 | 0.74 | | |
| 10. We feel we are doing a good job taking care of our child's condition. | 4.01 | 1.23 | 0.53 | | |
| 11. People with our child's condition have a normal length of life. | 3.82 | 1.40 | 0.65 | | |
| 12. We often feel unsure about what to do to take care of our child's condition. | 3.46 | 1.43 | 0.59 | | |
| 13. We have not been able to develop a routine for taking care of our child's condition. | 3.82 | 1.42 | 0.59 | | |
| 14. Even though our child has the condition. we have a normal family life. | 4.14 | 1.21 | 0.69 | | |
| 15. We have goals in mind to help us manage our child's condition. | 3.78 | 1.25 | 0.54 | | |
| 16. It is difficult to fit care of our child's condition into our usual family routine. | 3.66 | 1.40 | 0.74 | | |
| 17. Dealing with our child's condition makes family life more difficult. | 3.96 | 1.29 | 0.63 | | |
| 18. We know when our child needs to be a child. | 3.84 | 1.46 | 0.48 | | |
| 19. I am unhappy about the way my partner and I share the management of our child's condition. | 4.10 | 1.30 | 0.65 | | |
| **Family life difficulty and view of condition impact** | | | | 0.83 | 0.87 |
| 20. Our child's condition is like a roller coaster with lots of ups and downs. | 2.78 | 1.51 | 0.50 | | |
| 21. Our child's condition is the most important thing in our family | 3.48 | 1.42 | 0.38 | | |
| 22. It is very hard for us to take care of our child's condition | 2.10 | 1.28 | 0.46 | | |
| 23. Because of the condition. We worry about our child's future. | 2.52 | 1.48 | 0.52 | | |
| 24. We have enough money to manage our child's condition. | 2.29 | 1.29 | 0.41 | | |
| 25. A condition like the one our child has makes family life very difficult. | 2.20 | 1.34 | 0.62 | | |
| 26. Our child's condition rarely interferes with other family activities. | 2.14 | 1.22 | 0.53 | | |
| 27. Our child's condition will be harder to take care of in the future. | 2.07 | 1.25 | 0.47 | | |
| 28. We think about our child's condition all the time. | 2.75 | 1.45 | 0.60 | | |
| 29. It seems as if our child's condition controls our family life. | 2.12 | 1.28 | 0.69 | | |
| 30. It is hard to get anyone else to help us with our child's condition. | 2.13 | 1.29 | 0.45 | | |
| 31. It takes a lot of organization to manage our child's condition. | 2.74 | 1.43 | 0.47 | | |
| 32. We are sometimes undecided about how to balance the condition and family life. | 2.15 | 1.28 | 0.58 | | |
| 33. It is hard to know what to expect of our child's condition in the future. | 2.64 | 1.47 | 0.61 | | |
| 34. Our child would do better in school if he/she didn't have the condition. | 2.64 | 1.50 | 0.47 | | |
| 35. A condition like the one our child has makes it hard to live a normal life. | 1.96 | 1.28 | 0.49 | | |
| **Parental mutuality** | | | | 0.73 | 0.84 |
| 36. We are confident that we can take care of our child's condition | 4.34 | 0.94 | 0.38 | | |
| 37. We are a closer family because of how we deal with our child's condition. | 3.89 | 1.32 | 0.59 | | |
| 38. I am pleased with how my partner and I work together to manage our child's condition. | 4.15 | 1.09 | 0.65 | | |
| 39. My partner and I argue about how to manage our child's condition. | 3.63 | 1.32 | 0.56 | | |
| 40. My partner and I consult with each other before we make a decision about our child's care. | 4.10 | 1.14 | 0.66 | | |
| 41. My partner and I have similar ideas about how we should be raising our child. | 3.81 | 1.29 | 0.67 | | |
| 42. My partner and I support each other in taking care of our child's condition. | 4.31 | 1.00 | 0.64 | | |

In the validity studies from Korea, the 6-factor structure of the original FaMM was verified and is used in this way (Kim & Im, 2013). It was found in the cultural adaptation of the instrument for the Brazilian population that 5 of the 6 subscales were reliable and it was noted that the subscale "Management Effort" should be reassessed in later studies (Ichikawa et al., 2014). The fact that the original factor structure could not be verified in our study may have stemmed from the fact that various items and statements were differently perceived due to cultural differences. In this study, the family's management of an illness is not perceived to be separate from a child's daily life. As long as the family can manage the illness, the child's daily life can go on normally, or conversely, a child living a normal daily life can be considered as an indication that the child's illness management is going well. Because of this, the two separate sub-dimensions in the original measure that appear as two different concepts may have clustered under a single construct in the Turkish culture. Similarly, the two factors may have joined under a single factor because no differentiation was made between the magnitude of the impact of the illness and the difficulties encountered in daily life.

On the other hand, this apparently negative factor also carries with it various advantages in our opinion. One of these advantages is that illness management can be measured with a shorter questionnaire. Additionally, the study constitutes an example for scales that turn out to have different factor structures depending upon cultural differences.

The original FaMM scale's factor distribution models the FSMF model such that the 8 dimensions of its theoretical structure are distributed into 6 factors so that the subscales are complementary to each other (Knafl et al., 2011). Because the Turkish FaMM contains the questions on the original FaMM's subscales in 3 sub-dimensions, it supports the theoretical structure of FMSF.

### *Limitation*

This study has some limitations. One of these is that the three-factor structure emerging from the EFA could not be tested with CFA to determine whether it was in conformity with theory. Future studies should employ a new sampling to test the factor structure of the Turkish FaMM using CFA.

Another limitation of the study was that an assessment was not made of the convergent and discriminant validity of FaMM. In future studies, the convergent and discriminant validity of FaMM may be tested by using the Family Assessment Device that was used in the original study, which has since been adapted to the Turkish language (Bulut, 1990). Self-efficacy, coping and quality of life scales for children with

chronic diseases may also be useful in testing convergent and discriminant validity (Memik, Ağaoğlu, Coşkun, & Karakaya, 2008; Mert, Kadıoğlu, & Aksayan, 2018; Yıldız, 2017).

This study was school-based research and included data belonging to children with illnesses such as asthma that are more prevalent in the community. The fact that the study did not cover children/adolescents and the families who cope with less frequently seen or more complicated illnesses placed a limitation on the descriptive data. In this context, conducting more advanced hospital-based studies might be a useful pursuit in the future. In addition, hypothesis testing might be carried out in more advanced studies, comparing hospital emergency presentation figures and numbers of attacks with scale scores.

Our study did not evaluate intrafamily correlations since data was not collected separately from each parent. Future studies with data collected from both mothers and fathers may subsequently support our reliability results.

## Conclusions

This study reveals a new three-factor structure of 42 items for evaluating a family's management of chronic illness. New studies in the future may verify the validity of the new structure. This shorter form of FaMM may be tested for validity and reliability in other cultures. The stages of the study described here and our recommendations will provide guidance in this context.

## Declarations of interest

None.

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## Authorship contribution statement

Ayse Ergun: conceptualization, funding acquisition, methodology, validation, formal analysis, ınvestigation, writing - original draft, visualization, supervision. Fatma Nevin Sisman: conceptualization, funding acquisition, methodology, validation, formal analysis, ınvestigation, writing - original draft, visualization, supervision. Saime Erol: conceptualization, methodology, validation, writing - review & editing, supervision. Kamer Gur: conceptualization, methodology, validation, writing - review & editing, supervision. Nurcan Kolac: methodology, validation, writing - review & editing, supervision. Hasibe Kadioglu: methodology, validation, writing - review & editing, supervision.

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