Suggested Citation: Victoria N. Folse. "The Family Experience with Eating Disorders Scale: Psychometric Analysis" *Archives of Psychiatric Nursing* 21.4 (2007): 210-221.
Available at: http://works.bepress.com/vfolse/1.

"The Family Experience with Eating Disorders Scale: Psychometric Analysis"

Victoria N. Folse

The role of the family in the development and maintenance of eating disorders is frequently cited in the literature; however, common methodological issues, including the use of diverse family assessment instruments with inadequate psychometric properties, exist. Further, variables specific to families with eating disorder are not being captured in available instruments. The modeling and role-modeling theory (Erickson, H., Kinney, C. (Eds). 1990. *Modeling and role-modeling: Theory, practice, and research.* Austin, TX: Society for Advancement of Modeling and Role-Modeling; Erickson, H., Tomlin, E., Swain, M. A. 1983. *Modeling and role-modeling: A theory and paradigm for nursing.* Englewood Cliffs, NJ: Prentice-Hall.) was employed to structure the Family Experience with Eating Disorders Scale (FEEDS), a 53-item instrument that measures variables specific to families with eating disorder. An adequate degree of reliability and validity of the FEEDS was demonstrated with a multisite sample composed of three groups: 146 parents of individuals with eating disorders, 35 parents of adolescents with psychiatric disorders, and 100 parents of college students with no known psychiatric illness. Structural equation modeling supported the construct validity of a reduced 30-item instrument and confirmed three higher order measurement models. A provisional degree of known group validity was established. Tests of internal consistency and testretest at 2 weeks demonstrated adequate reliability. The FEEDS could be a useful adjunct to clinical assessment and could be instrumental in designing nursing interventions and measuring treatment outcomes for families with eating disorder.
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ANOREXIA NERVOSA AND bulimia nervosa are complex disorders for which etiology, particularly in regard to the role of family functioning, remains poorly understood (Leon, Keel, Klump, & Fulkerson, 1997). Although it is generally recognized that family dynamics can influence the development and maintenance of the eating disorder, a lack of consensus exists regarding the unique familial variables that predispose and maintain an eating disorder (Grilo, Devlin, Cachelin, & Yanovski, 1997; Wiseman, Harris, & Halmi, 1998). Identifying the factors that place individuals at risk for developing an eating disorder is valuable in understanding the etiology, in developing programs for vulnerable groups, in enhancing treatment procedures, and in improving short- and long-term treatment outcome (Leon et al., 1997). Evidence about the importance of familial factors in the risk for eating disorders (Strober, Freeman, Lampert, Diamond, & Kaye, 2000) and on family variables that affect the long-term treatment outcome of

eating disorders is emerging. Most research publications share common methodological issues, including the lack of control groups and the use of diverse family assessment instruments with vague or missing reports of psychometric properties (Sullivan, Bulik, Fear, & Pickering, 1998).

In addition to the lack of psychometric support for existing family assessment instruments cited in the eating disorder research, results published in the last decade about eating disorder family variables have not been captured in available instruments. The most commonly used instruments (Family Assessment Device [Epstein, Baldwin, & Bishop, 1983], Family Environment Scale [Moos, 1974; Moos & Moos, 1986, 1994], and the Family Adaptability and Cohesion Evaluation Scale [Olson, Bell, & Portner, 1992; Olson, Portner, & Lavee, 1985]) do not adequately assess the variables identified in the eating disorder literature, nor have they demonstrated adequate reliability and validity despite their wide use (Loveland-Cherry, Youngblut, & Leidy, 1990; Roosa & Beals, 1990). Results of recent risk factor and longitudinal outcome studies highlight omissions from existing family assessment instruments, including the need to assess familial concerns about weight, shape, and eating; the ability of the family to effectively resolve conflict; consistency in fostering open expression of emotions; and healthy maintenance of boundaries.

A new instrument, the Family Experience with Eating Disorders Scale (FEEDS), was developed because of the psychometric deficits in existing general family assessment instruments and because family dynamics specific to eating disorders were not captured in available measures. Fifty-three items consistent with a systems perspective of eating disorders were developed using the variables identified in the research literature and from the author's expertise in the field of eating disorders. Further, theoretical tenets from modeling and role-modeling theory (Erickson & Kinney, 1990; Erickson, Tomlin, & Swain, 1983) were employed to structure items specific to weight, shape, and eating. The modeling and role-modeling theory focuses on the psychosocial development of an individual within the context of a larger system and the subsequent acquisition of critical attributes that influence the capacity for effective coping and adaptation. Specifically, the drive for affiliated individuation, an inherent need to be associated with others while simultaneously maintaining individuality (Erickson, 1988), is particularly germane to individuals with eating disorders and to their families. As needs are repeatedly met, attachment occurs to the objects meeting those needs, resources are developed, and growth follows (Erickson, 1988). In contrast, real, threatened, or perceived loss of the attachment object can interfere with need satisfaction and growth. The relational dynamics present in a family with eating disorder may reflect insecure attachment; the eating disorder symptoms may result from the underlying family situation (H. C. Erickson, personal communication, March 24, 2000).

Results from a content validity study and a pilot study supported further development of the FEEDS (Folse, 2002). Content validity of the FEEDS was established in December 1999; seven professionals and two parents of individuals with eating disorders served as content experts. A total Content Validity Index of .92 for all nine experts combined and .97 for the seven professionals alone was established. Major revisions occurred on two items, and minor revisions were made on 18 items. Three items were added to capture sibling relationships. The 53 items were reordered using a random technique. A pilot study was subsequently completed in July 2000. The random sample consisted of 59 parents from separate families of individuals treated in an eating disorders program. Tests of internal consistency demonstrated high reliability of the instrument, while factor analysis supported the construct validity of a reduced 39-item tool. Minor revisions in naming the dimensions were supported by the content validity study and the pilot study and are reflected in the theoretical diagram of the FEEDS.

METHODOLOGY

The purpose of this study was to evaluate the psychometric properties of a newly established instrument designed to measure eating disorder family functioning. The following research questions were addressed:

1. To what extent is the FEEDS reliable when administered to parents of individuals with eating disorders?
   A. To what extent is the FEEDS internally consistent?

B. Which items of the FEEDS are redundant or do not contribute to the subscale scores?
C. To what extent does the FEEDS demonstrate test–retest reliability at 2 weeks?

2. To what extent does the FEEDS demonstrate adequate construct validity?
   A. What is the factorial structure of the FEEDS?
   B. To what extent does the FEEDS demonstrate known group validity?

Sample

The convenience sample for this multisite study was composed of three groups: parents of individuals diagnosed with an eating disorder, parents of adolescents with psychiatric disorders other than eating disorders, and parents of college students with no known psychiatric disorders. A total of 146 mothers or fathers (one self-selected parental representative per family) of individuals diagnosed with an eating disorder were recruited. The sample included families from three specialized eating disorders programs, two in the Midwest and one in the Southwest, whose child had received treatment anytime between 1999 and 2001. The sample, consisting predominantly of Caucasian mothers, is mostly highly educated and has an intact family. Further, more than half of the respondents had been involved in family therapy. In addition, comparison group samples of 35 parents of adolescents with psychiatric disorders (other than eating disorders) involved in an inpatient behavioral health program and 100 parents of college students with no known psychiatric disorders were recruited to evaluate the degree of known group validity (see Table 1).

Data Analysis

Several methods were used to explore the psychometric properties of the FEEDS. First, structural equation modeling (SEM) was used to analyze the degree of reliability of each item and the construct validity of the FEEDS. Once the measurement models of the FEEDS were determined, known group validity was evaluated using multivariate analysis of variance (MANOVA) with the Family Relationships subscale; the Interactional Skills subscale; and the Modeling of Weight, Shape, and Eating subscale as dependent variables and group assignment (families with eating disorder, psychiatric disorder, or no known disorders) as the independent variable. Internal consistency was determined for the final model through the use of Cronbach's α. Test–retest reliability at a 2-week interval was analyzed with a paired samples t test and with Pearson's product–moment coefficient (Pearson's r).

Each factor of the three subscales (Family Relationships; Interactional Skills; Modeling of Weight, Shape, and Eating) was initially tested separately and then combined in a full model to assure consistency with sample size guidelines and to facilitate testing of the hypothesized higher order model with SEM. Testing each factor separately was consistent with the sample size of at least five subjects per parameter advanced for SEM by Musil, Jones, and Warner (1998). The actual sample of 146 approached the 150–500 subjects recommended by Schumacker and Lomax (1996) for SEM.

LISREL 8.30 was used for data analysis; a series of measurement models were run using SEM. Listwise deletion was used for missing data. Measurement models for each factor were run separately, using the covariance matrix and maximum likelihood as the estimator. The best linear unbiased estimator—maximum likelihood—was chosen because data were treated as continuous. Models were revised by changing one parameter at a time until they fit the data well. Then, all the factor's measurement models hypothesized to make up a subscale were run together, allowing the parameters for the subscales to vary freely.

The criteria with which the fit of the model was evaluated included a nonsignificant Satorra–Bentler chi-square and a root mean square of approximation (RMSEA) of $\leq .08$ with a confidence interval of 0.00 to 0.10. Values approaching 0.00 for the root mean square residual (RMR) and the standardized RMR were desired. Further, the Normed Fit Index (NFI), the Non-Normed Fit Index (NNFI), and the Goodness-of-Fit Index (GFI) all indicated a good fit when their values were >.90. Decisions regarding the reliability of individual items were guided by the strength of the squared multiple correlations (R^2 values) and the strength and consistency of the t values. Items with the lowest R^2 below the minimum targeted value of .50 were eliminated first; additionally, changes in the consistency in t values of the remaining items were examined. The theoretical model underlying the FEEDS also guided modifications to the measurement model. Alterations to the model were made one at a time until a good fit that was theoretically sound was

Table 1. Comparison of Demographic Data

	Eating Disorder (n = 146)	Psychiatric (n = 35)	College (n = 100)
Age of parent surveyed			
M (*SD*)	47.00 (5.37)	42.34 (7.18)	48.61 (4.32)
Range	27–61	30–58	36–58
Gender of parent surveyed (%)			
Male	12	20	13
Female	88	80	87
Current marital status (%)			
Married, only once	69	43	77
Remarried	18	23	11
Never married	1	5	1
Divorced	8	26	9
Legally separated	3	3	1
Widowed	1	0	0
Not reported	0	0	1
Highest level of education attained (%)			
8th Grade	0	3	1
High school graduate	15	23	14
Some college	23	34	15
Associate degree	15	14	15
Bachelor's degree	33	12	33
Master's degree	10	6	16
Doctorate	4	6	2
Other	0	2	4
Ethnic/Racial background (%)			
Caucasian	99	94	94
African American	0	3	1
Hispanic	0	0	2
Asian	1	3	2
Other	0	0	1
Number of total children			
M (*SD*)	2.77 (1.05)	3.00 (1.37)	2.74 (1.30)
Range	1–7	1–7	1–4
Diagnosis of the child (%)			
Anorexia nervosa	49		
Bulimia nervosa	32		
Eating disorder not otherwise specified	19		
Depression		43	
Anxiety		9	
Behavioral		26	
Substance abuse		20	
Other		3	
Age of the child's diagnosis			
M (*SD*)	15.72 (2.62)	11.77 (3.96)	
Range	9–22	3–18	
Current age of the child			
M (*SD*)	18.00 (3.24)	13.94 (2.38)	20.40 (1.47)
Range	9–28	9–18	18–25
Gender of the child (%)			
Male	2	43	13
Female	98	57	87
Setting of treatment (%)			
Outpatient	50	48	
Partial hospitalization	8	9	
Inpatient	7	20	
Multiple settings	35	23	
Involvement in family therapy (%)			
Yes	68	56	
No	32	44	

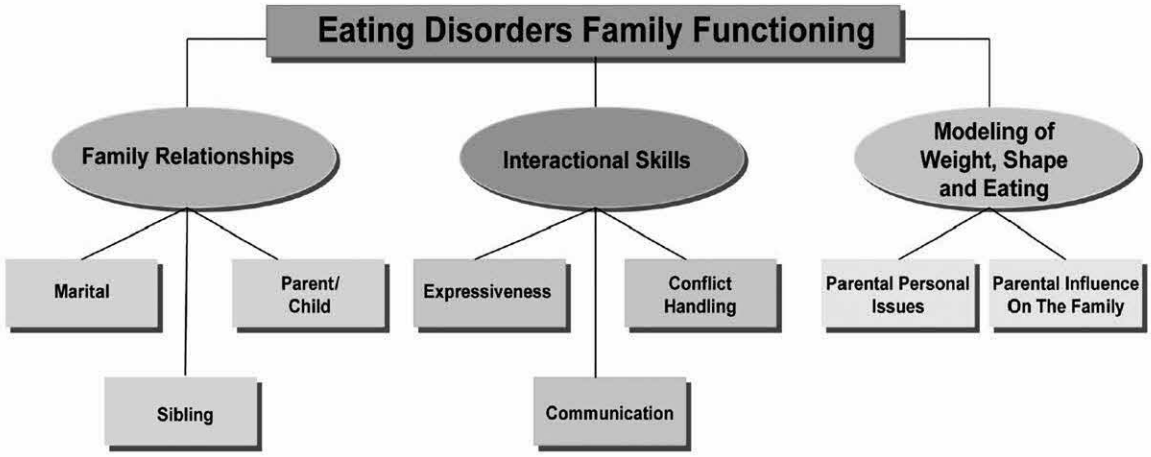

Fig 1. Family experience with eating disorders scale.

achieved; a final model was selected when no additional changes to the model improved the fit or enhanced the congruence with the theoretical foundation underlying the FEEDS.

RESULTS

Construct Validity

Higher order measurement models were established with SEM for each of the three hypothesized subscales (see Figure 1). The factors Marital Relationship, Parent/Child Relationship, and Sibling Relationships measured the subscale of Family Relationships (Items 7, 17, 18, 19, 30, 31, 34, 40, 42, 47, 48, and 50). The factors Expressiveness, Conflict Handling, and Communication measured the subscale of Interactional Skills (Items 10, 13, 29, 36, 38, 43, 49, 52, and 53). The factors Parental Personal Issues and Parental Influence on the Family measured the subscale of Modeling of Weight, Shape, and Eating (Items 6, 14, 15, 16, 22, 25, 32, 37, and 44). The revised FEEDS contains a total of 30 items with scores calculated for each of the three subscales; calculation of a total FEEDS score was not intended.

Family Relationships subscale

The Family Relationships subscale was hypothesized to contain the following factors: Marital Relationship (Items 3, 18, 26, 30, 34, 40, 45, 47, and 50), Parent/Child Relationship (Items 2, 5, 8, 17, 27, 31, 39, 48, and 51), Sibling Relationships (Items 7, 19, and 42), and Non-family Social Support (Items 4, 9, 24, and 28).

Measurement models for each of the proposed factors were run until a measurement model that fit the data was retained as a final model for each. Then, the final measurement models for the factors Marital Relationship, Parent/Child Relationship, Sibling Relationship, and Non-family Social Support were combined and run together. The entire Non-family Social Support factor was eliminated; it is noteworthy that this factor was also not retained in pilot testing of the FEEDS when factor analysis was used for data analysis.

Several modifications were made until the resultant model fit the data, Satorra–Bentler $\chi^2(51) = 65.86$, $P = .088$; RMSEA = 0.050, 90% confidence interval = 0.0–0.082; RMR = 0.12; NFI = 0.72; NNFI = 0.83; GFI = 0.90. A few low-performing items were retained for theoretical purposes. The R^2 values of the items ranged from 0.10 to 0.72, and the t values ranged from 2.98 to 8.00. Ten of the 12 items had R^2 values <.50. Although these items explained a smaller variance, they contributed significantly to the measurement model as indicated by the significant P values of the parameter estimates. The resultant 12-item model representing the combined items from the family factors was consistent with the theoretical foundation, and no further changes to the model were made (see Figure 2).

After final measurement models were determined for each of the three remaining subscales, the latent construct of Family Relationships was introduced into a higher order measurement model. The R^2 values of the factors Marital Relationship, Parent/Child Relationship, and

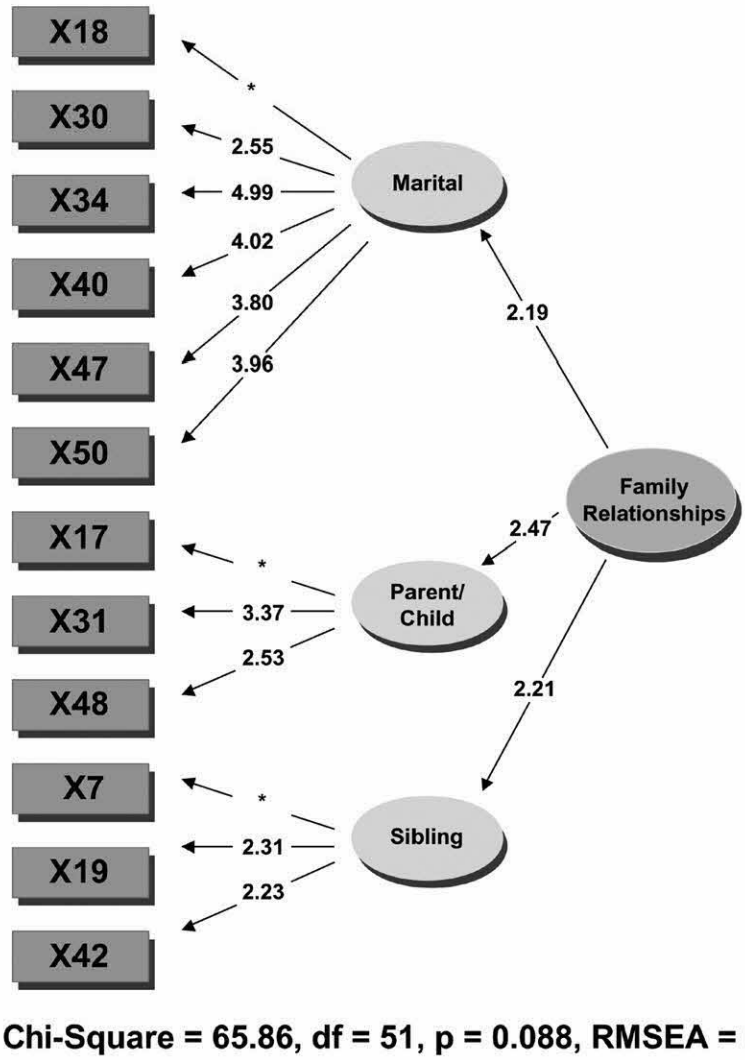

Fig 2. Family relationships subscale.

Sibling Relationship ranged from 0.12 to 2.69, and the t values ranged from 1.86 to 2.25. Negative error variance, a symptom of a serious fit problem, was reported on the Parent/Child Relationship factor; thus, the fit of this higher order model must be interpreted with caution.

Interactional Skills subscale

The Interactional Skills subscale was hypothesized to contain the following factors: Expressiveness (Items 12, 13, 38, 41, 43, and 46), Conflict Handling (Items 1, 10, 20, 49, and 52), and Communication (Items 29, 33, 36, and 53). Measurement models for each of the proposed factors were run until a measurement model that fit the data was retained as a final model. The final measurement models for the factors Expressiveness, Conflict Handling, and Communication were run together. The fit of the revised model improved after several modifications and was retained as the final measurement model despite the fact that the chi-square remained significant, Satorra–Bentler $\chi^2(24) = 41.22$, $P = .02$; RMSEA = 0.072, 90% confidence interval = 0.031–0.11; RMR = 0.11; NFI = 0.80; NNFI = 0.81; GFI = 0.92. A few marginally performing items were retained for theoretical purposes and to preserve a minimum of three items per factor. The R^2 values of the items ranged from 0.28 to 0.58, and the t values ranged from 4.64 to 8.10. Eight of the nine

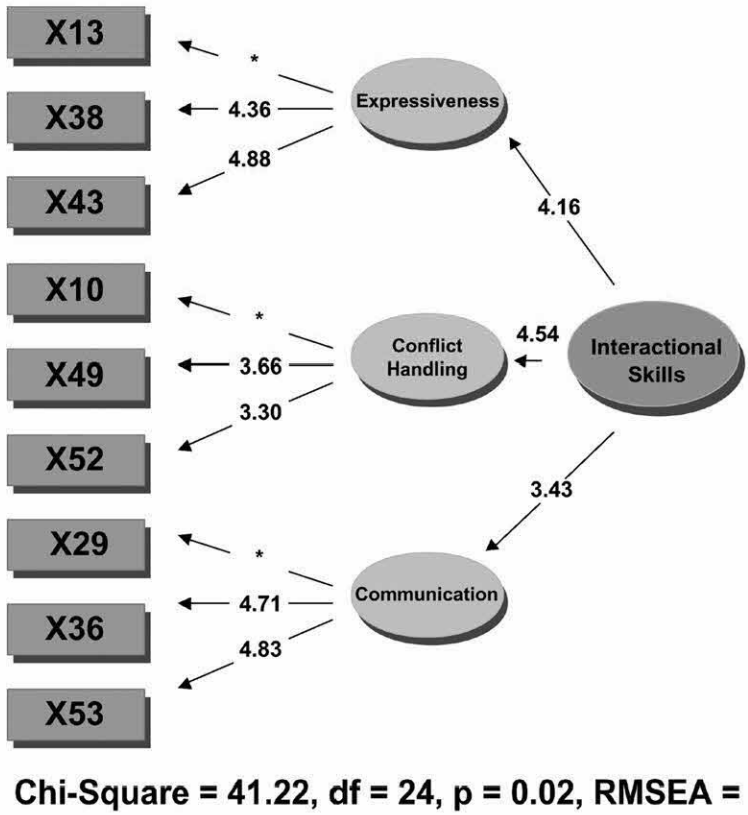

Fig 3. Interactional skills subscale.

items had R^2 values <.50. The resultant nine-item model, representing the combined items from the Interactional Skills factors, was consistent with the theoretical foundation, and no further changes to the measurement model were made (see Figure 3).

The latent construct of Interactional Skills was introduced into a higher order measurement model. The R^2 values of the factors Expressiveness, Conflict Handling, and Communication ranged from 0.43 to 0.61, and the t values ranged from 3.43 to 4.54.

Modeling of Weight, Shape, and Eating subscale

The subscale for Modeling of Weight, Shape, and Eating was hypothesized to be composed of the following factors: Parental Personal Issues (Items 6, 22, 25, 37, and 44) and Parental Influence on Family (Items 11, 14, 15, 16, 21, 23, 32, and 35). No changes to the Parental Personal Issues model were warranted, and it was retained as it was originally hypothesized. Following several modifications to the model of Parental Influence on the Family, the two were combined. Modifications were made until a revised model was accepted as the final model; it approximately fit the data, although the chi-square remained significant at the .05 level, Satorra–Bentler $\chi^2(26) = 41.58$, $P = .03$; RMSEA = 0.067, 90% confidence interval = 0.023–0.10; RMR = 0.12; NFI = 0.87; NNFI = .90; GFI = 0.93. The remaining items ranged from 0.30 to 0.56 with more consistent t values ranging from 4.90 to 10.44. Although the R^2 values of several items were <.50, they were retained. The final nine-item combined measurement model is presented in Figure 4.

The latent construct of Modeling of Weight, Shape, and Eating was introduced into a higher order measurement model. The path between Modeling and Parental Personal Issues was set to equal the path from Modeling to Parental Influence on the Family because of identification problems. The R^2 values of the factors Parental Personal Issues and Parental Influence on the Family were .47 and .48, respectively, and the t values were 6.23 for both factors.

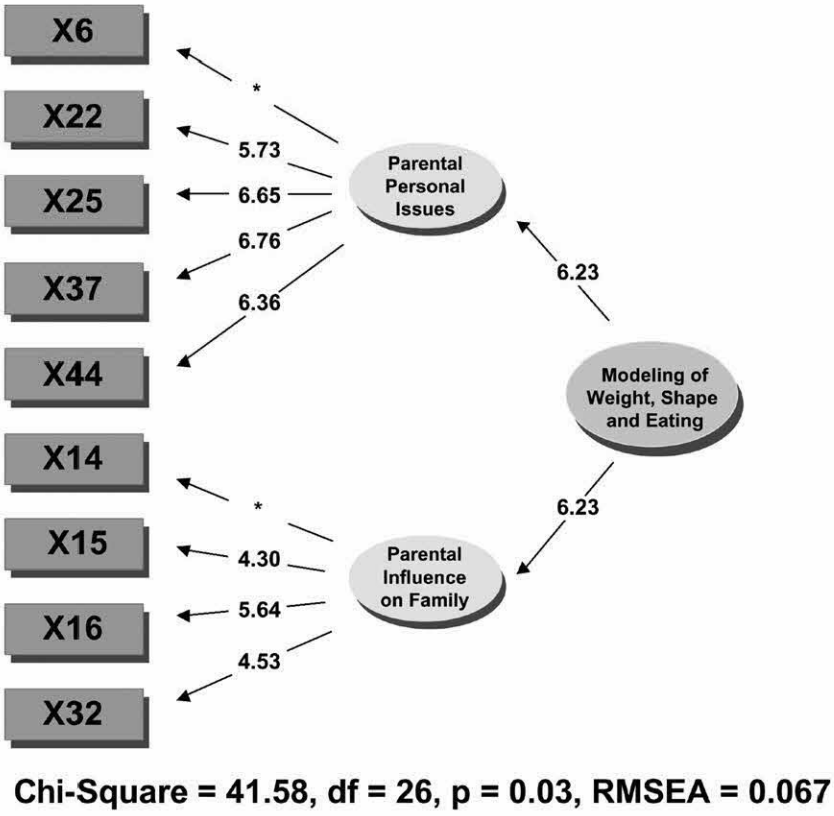

Fig 4. Modeling of weight, shape, and eating subscale.

Known Group Validity

Once the final measurement models were determined, the degree of known group validity was analyzed using MANOVA. Differences between the means of FEEDS subscale scores (Family Relationships; Interactional Skills; and Modeling of Weight, Shape, and Eating) for the eating disorder family sample, the psychiatric comparison family sample, and the college comparison family sample were simultaneously compared (see Table 2). The Box's test was nonsignificant; hence, homogeneity of variance was assumed. Using the Wilks' λ statistic, the results were found to be statistically significant, Wilks' $\lambda = .939$, $F(6, 550) = 2.93$, $P = .008$. The Family Relationships subscale, $F(2, 277) = 3.37$, $P = .04$, and the Modeling of Weight, Shape, and Eating subscale, $F(2, 277) = 3.45$, $P = .03$, were determined to account for the differences. Significance was not determined for Interactional Skills, $F(2, 277) = 1.36$, $P = .26$. Using the least significant

Table 2. Comparison of Subscale Mean Scores for Study Participants

Dependent Variable	Group	*M*	*SE*	95% Confidence Interval	
				Lower Bound	Upper Bound
Family Relationships	Eating disorder	48.952	0.902	47.176	50.727
	Psychiatric	45.429	1.836	41.815	49.042
	College	50.900	1.086	48.762	53.038
Interactional Skills	Eating disorder	36.421	0.527	35.383	37.458
	Psychiatric	35.686	1.073	33.574	37.797
	College	37.490	0.635	36.241	38.739
Modeling of Weight, Shape, and Eating	Eating disorder	38.979	0.699	37.603	40.356
	Psychiatric	36.029	1.423	33.226	38.831
	College	36.460	0.842	34.802	38.118

difference post hoc method at the .05 level, differences in the Family Relationships subscale scores were statistically significant between the adolescent psychiatric family group and the college family comparison group ($P = .011$). Significant differences were evident in the Modeling of Weight, Shape, and Eating subscale scores between the eating disorder family group and the college family group ($P = .02$). Differences between the eating disorder families and the adolescent psychiatric comparison families approached significance ($P = .06$) on the Modeling of Weight, Shape, and Eating subscale. Because the significance of the between-subjects effects was modest, a more conservative post hoc method was also calculated. Post hoc results using the Bonferroni method at the .05 level validated differences between the psychiatric and college family samples ($P = .03$) on the Family Relationships subscale. Differences between the eating disorder and college families only approached significance ($P = .07$) on the Modeling of Weight, Shape, and Eating subscale, and significance did not manifest itself on differences between the eating disorder and psychiatric families with this more conservative post hoc method. Group sizes were unequal and may have affected the results. Thus, the FEEDS demonstrated a provisional degree of known group validity in the Family Relationships and Modeling of Weight, Shape, and Eating subscales when families of individuals with eating disorders were compared to families of adolescents with psychiatric disorders and families with a college student with no known psychiatric disorder.

Table 3. Reliability for the Family Relationships Subscale

Variable	Item–Subscale Correlation	Item–Total Correlation
Children argue with each other (7)	.300	.321
Afraid of what future holds for children (17)	.412	.495
Involve spouse in decisions (18*)	.496	.341
Children close to each other (19*)	.253	.258
Concern for marriage when children leave (30)	.473	.419
Independence of children (31*)	.345	.384
Argue with spouse in front of children (34)	.470	.278
Agreement regarding children (40)	.375	.327
Children competitive with each other (42)	.210	.213
Recipient of spouse hostility (47)	.429	.246
Underinvolved in children's lives (48)	.208	.382
Considered divorce (50)	.527	.413
Cronbach's α	.74	.86

*Reversed scored item.

Table 4. Reliability for the Interactional Skills Subscale

Variable	Item–Subscale Correlation	Item–Total Correlation
Hope problems go away (10)	.489	.390
Openly express emotions (13*)	.421	.347
Frequently misinterpreted (29)	.397	.543
Accused of being critical (36)	.395	.497
Display affection toward family (38*)	.492	.466
Keep feelings to self (43)	.406	.360
Avoid conflict (49)	.347	.400
Afraid of disagreeing (52)	.323	.385
Send mixed messages (53)	.475	.529
Cronbach's α	.74	.86

*Reversed scored item.

Internal Consistency

In addition to the reliability established with SEM, reliability was measured through internal consistency and was reported as a Cronbach's α. Because it is early in the instrument development stage, internal consistency was established if

Table 5. Reliability for the Modeling of Weight, Shape, and Eating Subscale

Variable	Item–Subscale Correlation	Item–Total Correlation
Experience what I did with weight (6)	.561	.435
Concern of children being fat (14)	.500	.502
Removed food from the house (15)	.311	.341
Encouraged children to diet (16)	.493	.457
Frequently diet (22)	.578	.215
Negative comments about my weight (25)	.583	.408
Judge family on appearance (32)	.362	.526
Commercial weight loss programs (37)	.529	.276
Happier if I lost weight (44)	.640	.585
Cronbach's α	.81	.86

coefficient α values of .70 or above were obtained (Mishel, 1998; Nunnally & Bernstein, 1994). Further, item correlations between .30 and .70 were sought between individual items and the total score in each subscale (Ferketich, 1991). Interitem correlations were calculated to assess redundancy, and item–subscale correlations were considered for contribution to the subscale score. In this sample, correlations of less than .30 suggested that the item did not measure the identified construct, and correlations more than .70 indicated that the item was redundant. The Cronbach's α for the total FEEDS was .86, and the α values for the subscales ranged from .74 to .81 (see Tables 3–5). All item–subscale correlations were within the targeted .30 to .70 range, except for three items on the Family Relationships subscale, which fell below .30. The FEEDS demonstrated adequate internal consistency for a new instrument.

Test–Retest Reliability

Strong test–retest reliability was established at a 2-week interval (M = 13.85 days, SD = 3.91) with the eating disorder family sample (n = 60).

Test–retest reliability estimates of the three subscale scores of the FEEDS were analyzed as Pearson's correlation coefficients to estimate stability between Time 1 and Time 2 in the families with an individual with an eating disorder. A strong correlation (r = .879, P < .001) was established between the Family Relationships subscale at Time 1 and Time 2. A test–retest correlation of .769 (P < .001) was calculated for the Interactional Skills subscale, and a correlation of .853 (P < .001) was established with the Modeling of Weight, Shape, and Eating subscale.

A paired-samples t test was also calculated to determine the equality of means. Results showed that responses from Time 1 to Time 2 were statistically unchanged in all three subscales. The Family Relationships subscale (t = 0.609, P = .545) produced mean subscale scores of 50.25 (SD = 9.85) at Time 1 and 49.88 (SD = 10.0) at Time 2. The Interactional Skills subscale (t = 1.13, P = .264) demonstrated a mean subscale score of 36.17 (SD = 5.84) at Time 1 and a mean subscale score of 35.62 (SD = 5.83) at Time 2. The subscale scores of the Modeling of Weight, Shape, and Eating subscale (t = −0.453, P = .652) also supported good test–retest reliability with mean subscale scores of 38.86 (SD = 8.15) at Time 1 and 39.11 (SD = 8.00) at Time 2.

DISCUSSION

Results from this study show an adequate degree of reliability and validity and support continued development and testing of the FEEDS. SEM produced a parsimonious 30-item instrument. Analysis confirmed the hypothesized solution, consisting of three higher order measurement models of Family Relationships; Interactional Skills; and Modeling of Weight, Shape, and Eating. The factors that were supported and the items that were retained are consistent with the theoretical foundation of the FEEDS and represent familial variables advanced in the eating disorder literature. Because the criteria used to analyze model fit were met, adequate construct validity of the higher order measurement models was supported.

A provisional degree of known group validity was established using MANOVA. The Interactional Skills subscale did not distinguish patterns of relating among families in this sample. Differences were established between the means of the FEEDS subscale scores in the Family Relationships and Modeling of Weight, Shape, and Eating subscales for the eating disorder family sample, the psychiatric comparison family sample, and the college comparison family sample. The Modeling of Weight, Shape, and Eating subscale differentiated the eating disorder sample from the two comparison groups; this finding is crucial because the modeling domain is tied most strongly to the theoretical framework.

Support also exists for adequate internal consistency of the FEEDS. Cronbach's α for the instrument as a whole was .86, while the α values of the subscales ranged from .74 to .81. Reliability of individual items was also advanced with SEM. Although 23 of the 30 items had R^2 values less than .50, indicating that they explained a smaller percentage of error variance in the final FEEDS model, they contributed significantly to the model as evidenced by the significant P values of the parameter estimates. Further, each item retained was consistent with the theoretical foundation of the FEEDS.

Test–retest reliability was established with Pearson's product correlations and paired t tests. Significant positive correlations of .77 to .88 on the subscales were demonstrated with the FEEDS at a 2-week interval. Equality of means was evident in all three subscales at 2 weeks.

Some limitations did exist. Despite the fact that this was a multisite study, all members of the eating disorder sample represented individuals receiving treatment in specialty programs. Although families of individuals treated in a continuum of settings from outpatient to residential were included, many individuals who have eating disorders do not receive treatment or receive treatment from professionals who do not specialize in eating disorders. Generalizability may be further strengthened by a larger sample whose demographics are more diverse than the primarily intact, Caucasian, highly educated families who participated in this study.

Despite the use of comparison groups, another limitation of this study has to do with the characteristics of the comparison samples. Specifically, the college family sample was obtained exclusively from one private university in the Midwest, and the size of the psychiatric family comparison group was small. Further, the psychiatric sample was less educated, less traditional in marital structure, and had children in treatment who were younger than the eating disorder or college sample.

Results of known group validity also highlight the need for additional testing of the FEEDS. This study did not control for possible confounding variables, such as a history of trauma or psychiatric comorbidity, which may have been critical to assure that the samples were truly unique. Further, within-subjects differences were not examined; clinical sample was not analyzed based on different primary diagnoses. Differences in family dynamics based on eating disorder diagnosis have been reported in the literature (Fairburn, Cooper, Doll, & Welch, 1999; Fairburn, Welch, Doll, Davies, & O'Connor, 1997; Humphrey, 1989). Moreover, some studies have reported no differences in family variables between eating disorder and general psychiatric families (Friedmann et al., 1997).

It is important to interpret the results of the SEM with caution. Power analysis determined that a sample of 200 was needed to yield a power of .80 (MacCallum, Browne, & Sugawara, 1996). Further research, using a larger and more diverse sample, is needed to confirm these findings. List-wise deletion used in SEM eliminated certain items from analysis when a question did not apply to a family (e.g., questions regarding the marital dyad if the parent was divorced), which may have affected the final measurement models for this sample. Additionally, several measurement models were tested for each factor, thereby increasing the chance of committing a type I error.

The promising psychometric results obtained from the FEEDS testing has both clinical and research implications. Before the development of the FEEDS, no instrument with demonstrated reliability and validity that addressed the unique variables present in families with eating disorder existed. The consistent use of a reliable and valid instrument that measures family variables specific to eating disorders is needed to strengthen the knowledge base regarding family contributions to the development, maintenance, and treatment of eating disorders. Moreover, no existing tools utilize the nursing theoretical framework of modeling and role-modeling (Erickson et al., 1983) to conceptualize the role of the family in eating disorders. The results of this study further support the continued development and the expansion of the implications for use of the modeling and role-modeling theory. Clinically, the FEEDS could serve as a screening tool and be a useful adjunct to clinical assessment. Exploring individual responses to items on the FEEDS could assist clinicians to engage the family in treatment and may enhance a holistic view of the family system; moreover, the FEED offers a systematic way for examining differences in perception among family members. The FEEDS could be instrumental in designing interventions that support those factors within the family system that are effective and modify the family variables that are potentially unhealthy. Whether family dynamics play a causative or curative role in eating disorders, the use of the FEEDS could assure inclusion of the family in assessment and treatment. Further, once predictive validity is established, the FEEDS could be used to evaluate the effectiveness of nursing interventions employed in treatment.

REFERENCES

Epstein, N. B., Baldwin, L. M., & Bishop, D. S. (1983). The McMaster family assessment device. *Journal of Marital and Family Therapy, 9*, 171–180.

Erickson, H. & Kinney, C. (Eds.). (1990), *Modeling and role-modeling: Theory, practice, and research*. Austin, TX: Society for Advancement of Modeling and Role-Modeling.

Erickson, H., Tomlin, E., & Swain, M. A. (1983). *Modeling and role-modeling: A theory and paradigm for nursing*. Englewood Cliffs, NJ: Prentice-Hall.

Erickson, H. C. (1988). In J. Zeig, & S. Lanton (Eds.), *Developing Ericksonian therapy: State of the art*. New York: Brunner/Mazel.

Fairburn, C. G., Cooper, Z., Doll, H. A., & Welch, S. L. (1999). Risk factors for anorexia nervosa: Three integrated case–control comparisons. *Archives of General Psychiatry*, *56*, 468–476.

Fairburn, C. G., Welch, S. L., Doll, H. A., Davies, B. A., & O'Connor, M. E. (1997). Risk factors for bulimia nervosa. *Archives of General Psychiatry*, *54*, 509–512.

Ferketich, S. (1991). Aspects of item analysis. *Research in Nursing & Health*, *14*, 165–168.

Folse, V. N. (2002). The Family Experience with Eating Disorders Scale: Psychometric Analysis *UMI Dissertation Abstracts, 63*(4), 1789–1940.

Friedmann, M., McDermut, W., Solomon, D., Ryan, C., Keitner, G., & Miller, I. (1997). Family functioning and mental illness: A comparison of psychiatric and nonclinical families. *Family Process*, *36*(4), 357–367.

Grilo, C., Devlin, M., Cachelin, F., & Yanovski, S. (1997). Report of the National Institutes of Health (NIH) Workshop on the Development of Research Priorities in Eating Disorders. *Psychopharmacology Bulletin*, *33*(3), 321–333.

Humphrey, L. (1989). Observed family interaction among subtypes of eating disorders using structural analysis of social behavior. *Journal of Consulting and Clinical Psychology*, *57*, 206–214.

Leon, G., Keel, P., Klump, K., & Fulkerson, J. (1997). The future risk factor research in understanding the etiology of eating disorders. *Psychopharmacology Bulletin*, *33*(3), 405–411.

Loveland-Cherry, C. J., Youngblut, J. M., & Leidy, N. K. (1990). A psychometric analysis of the Family Environment Scale. *Nursing Research*, *38*(5), 262–266.

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, *1*, 130–149.

Mishel, M. H. (1998). Methodological studies: Instrument development. In P. J. Brink, & M.J. Wood (Eds.), *Advanced design in nursing research*. (2nd ed). Thousand Oaks, CA: Sage Publications.

Moos, R. H. (1974). *Family Environment Scale manual*. Palo Alto, CA: Consulting Psychologists Press.

Moos, R. H. & Moos, B. S. (1986). *Family Environment Scale manual*. (2nd ed.). Palo Alto, CA: Consulting Psychologists Press.

Moos, R. H. & Moos, B. S. (1994). *Family Environment Scale manual*. (3rd ed.). Palo Alto, CA: Consulting Psychologists Press.

Musil, C. M., Jones, S. L., & Warner, C. D. (1998). Structural equation modeling and its relationship to multiple regression and factor analysis. *Research in Nursing & Health*, *21*, 271–281.

Nunnally, J. C. & Bernstein, I. H. (1994). *Psychometric theory*. (3rd ed.). New York: McGraw-Hill Inc.

Olson, D. H., Bell, R., & Portner, J. (1992). *FACES-II manual*. St. Paul: University of Minnesota, Department of Family Social Science.

Olson, D. H., Portner, J., & Lavee, Y. (1985). *FACES-III manual*. St. Paul: University of Minnesota, Department of Family Social Science.

Roosa, M. W. & Beals, J. (1990). Measurement issues in family assessment: The case of the Family Environment Scale. *Family Process*, *29*, 191–198.

Schumacker, R. E. & Lomax, R. G. (1996). *A beginners guide to structural equation modeling*. Mahwah, NJ: Lawrence Erlbaum.

Strober, M., Freeman, R., Lampert, C., Diamond, J., & Kaye, W. (2000). Controlled family study of anorexia nervosa and bulimia nervosa: Evidence of shared liability and transmission of partial syndromes. *American Journal of Psychiatry*, *157*(3), 393–401.

Sullivan, P. F., Bulik, C. M., Fear, J. L., & Pickering, A. (1998). Outcome of anorexia nervosa: A case–control study. *American Journal of Psychiatry*, *155*, 939–946.

Wiseman, C., Harris, W., & Halmi, K. (1998). Eating disorders. *Medical Clinics of North America*, *82*(1), 145–159.