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Use of an Observational Coding System with Families of Adolescents: Psychometric Properties among Pediatric and Healthy Populations

Astrida Seja Kaugars
Marquette University, astrida.kaugars@marquette.edu

Kathy Zebracki
Rush Medical College

Jessica C. Kichler
Medical College of Wisconsin

Christopher J. Fitzgerald
Marquette University

Rachel Neff Greenley
Rosalind Franklin University of Medicine and Science

See next page for additional authors

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Authors
Astrida Seja Kaugars, Kathy Zebracki, Jessica C. Kichler, Christopher J. Fitzgerald, Rachel Neff Greenley, Ramin Alemzadeh, and Grayson N. Holmbeck

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Use of an Observational Coding System with Families of Adolescents: Psychometric Properties among Pediatric and Healthy Populations

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Abstract

Objective: To examine reliability and validity data for the Family Interaction Macro-coding System (FIMS) with adolescents with spina bifida (SB), adolescents with type 1 diabetes mellitus (T1DM), and healthy adolescents and their families.

Methods: Sixty-eight families of children with SB, 58 families of adolescents with T1DM, and 68 families in a healthy comparison group completed family interaction tasks and self-report questionnaires. Trained coders rated family interactions using the FIMS.

Results: Acceptable interrater and scale reliabilities were obtained for FIMS items and subscales. Observed FIMS parental acceptance, parental behavioral control, parental psychological control, family cohesion, and family conflict scores demonstrated convergent validity with conceptually similar self-report measures.

Conclusions: Preliminary evidence supports the use of the FIMS with families of youths with SB and T1DM and healthy youths. Future research on overall family functioning may be enhanced by use of the FIMS.

Introduction

The use of observational measures of family functioning has gained increased attention in pediatric psychology research (e.g., Barakat, 2008). Observing family processes provides an opportunity to examine the dynamic, reciprocal, and transactional characteristics of youth–parent interactions (Kerig, 2001) independent of the family members' own perceptions of their behavior (Stoneman & Brody, 1990). A recent review of evidence-based assessments of family functioning included numerous observational measures (Alderfer et al., 2008). However, significant variability regarding the strength of these measures' psychometric properties exists, and most have not been evaluated in both healthy and pediatric populations. The present study provides comprehensive information about the psychometric characteristics of an observational coding system (i.e., the Family Interaction Macro-coding System; FIMS; Holmbeck, Belvedere, Gorey-Ferguson, & Schneider, 1995) that has been used with families of adolescents with two

different types of chronic medical conditions [i.e., spina bifida (SB) and type 1 diabetes mellitus (T1DM)] as well as with families of healthy youths. This study documents the reliability and validity of the FIMS in assessing key domains of parenting (i.e., parental acceptance, behavioral control, and psychological control) and family functioning (i.e., family cohesion and conflict) among youths and their families.

Parental acceptance, behavioral control, and psychological control have been identified as key parenting behaviors that have clear implications for youths' psychosocial adjustment (Steinberg, 1990). *Parental acceptance* describes the degree to which parents are supportive of and able to adapt to their children's needs and desires (Steinberg, 1990). The extent to which parents set and consistently enforce developmentally appropriate standards for youths' behavior (Steinberg, 1990) describes *parental behavioral control*. *Parental psychological control* is an intrusive parental behavior that compromises a child's individuality and inhibits autonomy development (Steinberg, 1990). Family cohesion and conflict have been identified as central family processes in theories of adolescent development (Cox, Brooks-Gunn, & Paley, 1999; Holmbeck, 1996). *Family cohesion* involves ''positive, supportive interaction among family members,'' (Cox et al., 1999, *p*. 322). *Family conflict*, which describes parent–adolescent disagreements typically over household responsibilities and privileges, has been posited to be central to transforming parent–adolescent relationships during adolescence (Holmbeck, 1996).

The FIMS is a global coding method developed by Holmbeck et al. (1995) and revised by Holmbeck, Zebracki, Johnson, Belvedere, and Hommeyer (2007), which was based on a system developed by Smetana, Yau, Restrepo, and Braeges (1991). The system developed by Smetana et al. (1991) involved rating each family member separately on 16 scales assessing affect and communication, and the family unit was rated on 10 scales (e.g., conflict, power) that resulted in 58 items total. This system was revised by naming each code type (e.g., ''confidence in stating opinions''), adding labels to each level of the Likert-scale coding (e.g., 1 =''almost not at all''; 5 =''very much''), and adding codes based on past literature relevant to the constructs assessed (see manual for list of citations that were influential in developing the new codes). The 2007 version of the FIMS includes 113 separate codes, 36 code types, and an additional seven family systems code types (e.g., ''Family is overly close, stuck, over concerned with each other''). Within each code type, ratings are provided for each family member or, in some cases, just for the parent (i.e., mother, father), for the dyad (e.g., mother–youth), or for the family as a whole. Past literature (Cox & Brooks-Gunn, 1999; Holmbeck et al., 2007; Steinberg, 1990) was used to guide the grouping of individual items to represent five constructs: parental acceptance, parental behavioral control, parental psychological control, family cohesion, and family conflict (see Table

I for items included in codes).

The FIMS has been employed in prior work by Holmbeck and colleagues in a longitudinal study of preadolescents and adolescents with SB. Such work has demonstrated differences in the FIMS scores between youth with SB and typically developing youth (Holmbeck, Coakley, Hommeyer, Shapera, & Westhoven, 2002; Holmbeck, Shapera, & Hommeyer, 2002; Holmbeck et al., 2003), relations between FIMS subscales and other family observation measures (Holmbeck, Johnson et al., 2002), relations between family conflict and longitudinal trajectories of FIMS subscale scores (Greenley, Holmbeck, & Rose, 2006), relations between pubertal timing and longitudinal trajectories of FIMS subscale scores (Coakley, Holmbeck, Friedman, Greenley, & Thill, 2002), and associations between FIMS subscales and child problem-focused coping (McKernon et al., 2001). Although these findings have made conceptual and empirical contributions to the larger literature on family relations in youths with chronic health conditions, there has been no attempt to evaluate systematically the validity of the FIMS subscales employed in these earlier studies. Moreover, all of these studies have been conducted in a single laboratory. Thus, an additional purpose of this study was to examine the versatility of the FIMS across different chronic health conditions, ages, settings, and research protocols.

Lindahl (2001) described the need to establish the reliability of family coding systems across clinical and non-clinical samples, different socioeconomic groups, different cultural, ethnic, or racial groups, and home and lab settings. Demonstrating the reliability and validity of observational coding systems across pediatric and healthy populations is also important. Moreover, it is unclear whether variability across medical conditions might result in differences in the use of family coding systems with different populations (Alderfer et al., 2008).

To establish an evidence base of support for the FIMS, the present manuscript presents reliability and validity data for the FIMS as used with adolescents with two different chronic illnesses as well as with healthy youths and their families. The unique contribution of this manuscript is the systematic reporting of reliability (i.e., rater reliability and internal consistency) and construct validity of the observational scores in three groups (i.e., youths with SB, adolescents with T1DM, and healthy youths), with adolescents of different ages, across two independent laboratories, in different research settings, with different tasks, and with different combinations of parents and youth (i.e., dyads and triads). The aim of the study is to demonstrate how the use of the FIMS can be generalized to different pediatric and healthy adolescent populations.

Construct validity for the FIMS was evaluated by examining associations with self-report questionnaires assessing similar (convergent) constructs. The two studies included in this

manuscript were developed independently, and therefore different measures were used to demonstrate convergent validity. In general, it was expected that convergent validity for the FIMS ratings would be evidenced by associations with self-report measures that assessed the same constructs coded with the FIMS. Moreover, several hypotheses were based on the assumption that the FIMS is measuring aspects of the family emotional climate, which is described as ‘‘the overall intensity and valence of emotional exchange’’ (Wood et al., 2008, *p*. 23), where both positive and negative aspects of emotional exchanges are relevant.

First, it was hypothesized that FIMS parental acceptance scores would be positively related to parental ratings of acceptance and positive expressiveness and negatively related to negative expressiveness and parenting stress. FIMS parental behavioral control scores were expected to be positively associated with parental ratings of behavioral control. It was hypothesized that FIMS parental psychological control scores would be positively related to parental ratings of psychological control, negative expressiveness, and parenting stress. For the FIMS scores assessing family functioning, FIMS family cohesion scores were expected to be positively associated with parental ratings of family cohesion and positive expressiveness and negatively associated with family conflict and parenting stress. Finally, it was hypothesized that FIMS family conflict scores would be positively related to parental ratings of family conflict, negative expressiveness, and parenting stress and negatively related to family cohesion.

Method

The data sets analyzed for this article come from two studies conducted in independent laboratories in the Midwest. Abbreviated summaries of participants and measures relevant to the present article are provided, and readers are encouraged to review cited references for complete descriptions of the larger studies. Institutional review boards at participating institutions approved the described studies.

Participants

SB and Comparison Groups

A longitudinal study examining the transition to adolescence in families of children with SB (N = 68) and a comparison group of typically developing children matched on demographic variables (N = 68) included assessments at four time points. Information about the samples, including participant recruitment, is described in detail in previous publications (e.g., Holmbeck, Coakley et al., 2002). For the SB group, of the 310 children who were identified by recruitment sites, 70 families were included in the final sample. In order to recruit a comparison group,

approximately 1,700 letters were sent to 8-and 9-year-old children to obtain a sample of 72 families. Initially, a demographic comparison of these original samples revealed sample differences on 3 of 10 demographic matching variables. To facilitate group-level matching on all 10 variables and to produce two subsamples of equal size, two participants with SB and four comparison participants were dropped, thus yielding a sample size of 68 in both groups. Data from the Time 3 (T3; i.e., 12–13 years old) and Time 4 (T4; i.e., 14–15 years old) were used in the present analyses. Data were collected via home visits. Biological mothers from all families participated; however, only 55 (81%) fathers/stepfathers in the SB group and 52 (76%) fathers/stepfathers in comparison group participated. The present analyses include the following number of participants for the SB and comparison groups, respectively: T3, n = 63, 66; and T4, n = 59, 65. See Table II for demographic characteristics at T3.

T1DM Group

Adolescents aged 12–17 years with a diagnosis of T1DM for 6 months or more were recruited from an outpatient endocrinology clinic at a children's hospital (Kichler, Kaugars, Ellis, & Alemzadeh, 2010). Of the 100 eligible and interested participants, 73 completed the study questionnaires. Fifty-eight adolescents and their mothers completed interaction tasks before or after a diabetes clinic appointment and were included in the present analyses. On average, adolescents had been diagnosed with T1DM for 5.44 (SD = 3.46) years and had mean HbA_{1c} values of 8.27% (SD = 1.29) in the previous year. See Table II for demographic characteristics.

Procedure

Observational Measures

Participating families in all groups were videotaped during family interaction tasks that were completed during home visits (i.e., SB and comparison groups) or in a clinical research setting (i.e., T1DM group). All participants completed a conflict task based on the Family Social Interaction Task (Smetana et al., 1991). Prior to the conflict task, parents and children completed a version of the Issues Checklist (Robin & Foster, 1989) where they indicated the frequency and intensity of discussion of various issues over the past 2 (SB and comparison groups) or 4 (T1DM group) weeks. Research assistants calculated weighted conflict scores (i.e., frequency × intensity) for each issue by family member and presented the family the five issues with the highest weighted scores. Each family selected three of these issues for a 10-min discussion.

Participants from the SB and comparison groups also completed two additional family interaction tasks (i.e., an unfamiliar board game task and a structured family interaction task). For the unfamiliar board game task, families spent 10 min establishing rules and playing the

game. Families were also presented with the Structured Family Interaction Task (Ferreira, 1963). Each family member independently completed a 5-item questionnaire and provided first and second preferences for possible family activities. For the interaction portion of the task, the family was given a blank copy of this questionnaire and asked to come to a group consensus regarding their top two choices for each of five items [e.g., You and your family have a free evening to spend together. What will you do? (a) Go to a movie; (b) Go out for dinner; (c) Go bowling; (d) Go to a ball game; and (e) Stay in and do something together]. This task continued until families reached a consensus.

In addition to completing the conflict task, adolescents in the T1DM group and their mothers were presented with five vignettes of situations adolescents might typically encounter, including two diabetes-related situations. They were asked to discuss possible resolutions to these situations for 10 min.

FIMS

The family interaction tasks were coded using the FIMS. Each coder viewed an entire family interaction task and then rated the families on codes assessing interaction style, conflict, affect, control, problem solving, and family systems using 5-point Likert scale ratings. The coding manual describes behavioral descriptions for each anchor on the Likert scale (Holmbeck et al., 1995; Holmbeck et al., 2007). For example, the item assessing ‘‘Warmth’’ captures signs of positive connection in the relationship as shown through verbal or nonverbal behaviors (5 = Very warm; 4 = Fairly warm; 3 = Somewhat warm; 2 = Fairly cold; 1 = Very cold). Research assistants spent 20–30 min coding each interaction.

Undergraduate and graduate research assistants were trained for 10 hrs prior to coding the videotapes. Training involved discussing individual item codes and reviewing previously coded interactions with an expert coder. The coding manual was developed in the laboratory that studies adolescents with SB and a comparison group; therefore, research assistants there could consult with the measure’s developer. Research assistants for the study with adolescents with T1DM met with an expert coder from the laboratory where the FIMS was developed initially, and thereafter, the expert coder was available by telephone for consultation. Coders achieved 90% agreement prior to independently coding (i.e., ‘‘agreement’’ = concordance across coders within one point on the Likert scale).

For each of the interaction tasks, behaviors were rated by two (SB and comparison groups) or three (T1DM group) coders, and item level means of the raters for each task were averaged across the tasks to yield a single score for each coding item for each family.

Questionnaire Measures

Participants also completed self-report questionnaires assessing parenting and family variables which varied by study given the independent nature of the studies. The measures used in the present analyses were selected based on previously published theoretical and empirical evidence for their convergent validity with the parent and family constructs from the FIMS.

Parenting Variables: *SB and Comparison Groups*

Child Report of Parenting Behavior Inventory (CRPBI): The CRPBI (Schaefer, 1965; Schludermann & Schludermann, 1970; Schwarz, Barton-Henry, & Pruzinsky, 1985) is a 108-item scale that assesses maternal and paternal child-rearing behaviors. The scale includes 18 subscales that tap three second-order factors: acceptance–rejection, firm control–lax control, and psychological control– psychological autonomy (referred to here as acceptance, behavioral control, and psychological control, respectively). Mothers, fathers, and children completed versions of this measure by rating parents on a 3-point Likert scale (following the rewording procedure used by Schwarz et al., 1985). Because of time considerations, only 44 items from the larger 108-item scale were administered, which included all items from the following subscales: Acceptance (eight items) and Rejection (eight items, reverse scored) from the acceptance–rejection factor; Control (five items), Enforcement (five items), and Lax Discipline (five items, reverse scored) from the firm control–lax control factor; and Intrusiveness (five items) and Hostile Control (eight items) from the psychological control–psychological autonomy scale. The relevant subscales were collapsed into composites to assess acceptance, behavioral control, and psychological control, respectively. Youths rated maternal and paternal parenting behaviors separately, and parents rated their own behaviors. Youth–parent intercorrelations for the three CRPBI composites ranged from .24 to .52 for the SB group and from .25 to .45 for the comparison group. Youth and parent reports of parenting behavior were combined to form composite ratings of parenting behavior. Alphas for maternal parenting composites ranged from .67 to .82 in the SB group and from .64 to .91 in the comparison group. Alphas for paternal parenting composites ranged from .66 to .89 in the SB group and from .73 to .90 in the comparison group.

Family Variables: SB and Comparison groups

Family Environment Scale (FES): Parents completed a shortened version of the FES (Moos & Moos, 1986), which is a widely used 90-item measure that assesses socio-environmental characteristics of the family system and has satisfactory psychometric properties. The FES includes 10 subscales and was administered in a 4-point Likert scale format at T3 and T4. Higher scores indicate higher values of the given construct. The Cohesion and

Conflict subscales were used in these analyses. Parent composites were formed for these scales; mother-and father-report responses were averaged. Combining parent data was appropriate as we sought to assess cohesion and conflict at the systemic level. Moreover, between-parent correlations on these scales were statistically significant and moderate for cohesion (.44 for the SB group and .59 for the comparison group) and high for conflict (.93 for the SB group and .93 for the comparison group). Alphas for the SB group were .93, .92, and .87 for cohesion, conflict, and control respectively. Corresponding alphas for the comparison group were .95, .94, and .92.

Parent–Adolescent Conflict Scale (PAC): The PAC is a 20-item version of the Issues Checklist (Robin & Foster, 1989). The intensity ratings, which require the respondent to rate how intense this discussion was on a 5-point Likert scale (‘‘calm’’ to ‘‘angry’’), were used in this study. Total scores are item means (range 1.0–5.0) with higher scores indicating greater levels of intensity of conflict. Internal consistency estimates cannot be computed because respondents only provide reports of intensity if they had discussed a given topic (i.e., not all respondents responded to all items).

Family Variables: T1DM Group

Issues Checklist (IC): The IC (Robin & Foster, 1989) includes 44 items that describe potential adolescent–parent conflict. Nine additional items were added that addressed diabetes-related concerns. The scoring for the IC is identical to the scoring for the PAC described previously. Scores from both adolescents and their mothers were used.

Self-Expressiveness in the Family Questionnaire (SEFQ): The SEFQ (Halberstadt, Cassidy, Stifter, Parke, & Fox, 1995) assesses parents’ reports of their individual emotional expressiveness during a variety of positive and negative events that occur within the family. Mothers responded to 40 items where higher numbers on a 9-point Likert scale indicate greater frequency of affective expression in that situation. The Positive Expressiveness and Negative Expressiveness summary scores were used in the present analyses. Alphas were .91 and .86 for the positive and negative scores, respectively.

Stress Index for Parents of Adolescents (SIPA): This 90-item parent-report questionnaire assesses the amount of stress experienced by a parent of an adolescent (Sheras, Abidin, & Konold, 1998). The Total Parenting Stress score is a composite of all items across all domains with higher scores indicating more stress. Alpha for the Total Parenting Stress score was .96.

Data Analytic Plan

For the FIMS subscales, intraclass correlations were computed to assess scale-level inter-rater reliabilities, and Cronbach’s α reliability coefficients were calculated to determine

scale-level internal consistencies. Pearson bivariate correlations were computed to examine associations among the parenting and family questionnaire variables and the five FIMS scores. Subsequently, a series of hierarchical regressions were conducted for those FIMS scores with multiple significantly correlated independent (i.e., questionnaire) variables. Variables were entered into the model using stepwise entry in two separate blocks. Questionnaire variables that were hypothesized to be associated with the FIMS scores were entered in the first block. In a second block, we examined whether the remaining variables predicted beyond the variance accounted for by the hypothesized variable(s). The sample sizes ranged from 53 to 65 across the three groups. According to the guidelines established by Cohen (1992), a sample size of 30–34 would be required to detect a large effect and a sample of 67–76 would be required to detect a medium effect with two to three variables. Thus our sample was slightly underpowered for detecting a medium effect size.

For the SB and comparison groups, analyses were conducted in the following manner. First, analyses were conducted separately for T3 and T4. Second, for parenting behavior questionnaire data, adolescent and mother reports of mothers' parenting and adolescent and father reports of fathers' parenting were averaged. For the observed family-level outcomes (conflict and cohesion), composites of the questionnaire-based parenting variables (mean of maternal and paternal variables) were employed. Then, analyses were run separately for each group (SB and comparison). When predicting the observed maternal parenting variables, the questionnaire-based maternal predictors were employed; the same strategy was used for the paternal variables. For the regressions examining parenting variables (i.e., acceptance, behavioral control, and psychological control), the questionnaire variable that was assessing the same FIMS parenting construct was entered in the first block (e.g., acceptance, behavioral control, or psychological control; all assessed using the CRPBI), and the remaining parenting variables that were significantly associated with the FIMS score of interest were entered in the second block. For regressions examining family conflict, both questionnaire measures of family conflict (i.e., FES or PAC) were entered in the first block, and then family cohesion was entered in the second block.

After examining the correlation matrix, four regressions were conducted for the T1DM group. For all of the regressions, the hypothesized questionnaire variables [e.g., positive expressiveness (SEFQ), negative expressiveness (SEFQ), total parenting stress (SIPA), and/or conflict (IC)] were entered in the first block, and the remaining variables were entered in the second block.

Results

FIMS Reliability

Interrater Reliability

Scale-level interrater reliabilities were calculated using intraclass correlations for each of the groups for maternal, paternal, and family scores (Table III). Reliabilities were computed by including all of the tasks administered to each group (i.e., three tasks for SB and comparison groups; two tasks for T1DM group). Reliability coefficients ranged from .53 to .90 for parental scores and .46 to .87 for family-level scores.

Internal Consistency of Scales

Cronbach's α reliability coefficients were computed to determine internal consistency of each of the FIMS scales (see Table III). Mean scores across all of the coders for each item and for all of the tasks were used in the calculations. The internal consistency estimates ranged from .58 to .86 for parental scores and .68 to .88 for family-level scores.

FIMS Validity

For the SB and comparison groups, it was hypothesized that scores from self-report questionnaires would be associated positively with similar constructs assessed with the FIMS. Specifically, CRPBI reports of parental acceptance, parental behavioral control, and parental psychological control would be associated positively with FIMS ratings of parental acceptance, parental behavioral control, and parental psychological control, respectively. Parental ratings of family cohesion (FES) were expected to be associated positively with FIMS ratings of family cohesion. Similarly, questionnaire measures of family conflict (FES and PAC) were expected to be associated positively with FIMS ratings of family conflict.

SB Group

Bivariate correlations are presented in Table IV. Contrary to hypothesis, for mothers in the SB group, CRPBI reports of maternal acceptance were unrelated to FIMS ratings of maternal acceptance, but psychological control was negatively associated with FIMS maternal acceptance at T3, $r = -.31$, $p < .05$, and T4, $r = -.34$, $p < .05$.

As predicted, at T3 CRPBI reports of behavioral control were associated positively with FIMS maternal behavioral control, $r = .35$, $p < .01$. This finding was not significant at T4, however, CRPBI reports of psychological control were positively associated with FIMS maternal behavioral control, $r = .28$, $p < .05$.

Consistent with hypothesis, CRPBI reports of psychological control were associated positively with FIMS maternal psychological control at T3, $r = .37$, $p < .01$, and T4, $r = .41$, $p < .01$.

In addition, CRPBI reports of behavioral control were associated positively with FIMS maternal psychological control at T3, $r = .40$, $p < .01$, and T4, $r = .41$, $p < .01$. In regression analysis, at T3 after controlling for CRPBI reports of psychological control, FIMS maternal psychological control was predicted positively by CRPBI reports of maternal behavioral control, $\beta = .28$, $p < .05$; $F(2, 54) = 6.51$, $p < .01$, and all of the variables accounted for 44% of the variance in the FIMS score. At T4, after controlling for CRPBI reports of psychological control, maternal behavioral control did not emerge as significant predictor.

Among fathers in the SB group, no CRPBI reports predicted FIMS acceptance or behavioral control ratings at T3 or T4. As predicted, CRPBI reports of psychological control were positively associated with FIMS paternal psychological control at T3, $r = .36$, $p < .05$, and T4, $r = .55$, $p < .001$. In addition, at T4 CRPBI reports of behavioral control were positively associated with FIMS paternal psychological control, $r = .51$, $p < .01$. In regression analysis, however, T4 CRPBI reports of paternal behavioral control were not predictive of FIMS paternal psychological control after controlling for CRPBI reports of psychological control.

Regarding FIMS family variables, the FES and PAC reports did not predict family cohesion or family conflict scores at either T3 or T4.

Comparison Group

Bivariate correlations are presented in Table V. In the comparison group, as predicted, CRPBI reports of maternal acceptance were associated positively with FIMS maternal acceptance ratings at T3, $r = .51$, $p < .001$, and T4, $r = .35$, $p < .01$. CRPBI reports of maternal psychological control were associated negatively with FIMS maternal acceptance ratings at both T3 and T4, $r = -.39$, $p < .001$ at T3; $p < .01$ at T4. In addition, T4 CRBPI reports of maternal behavioral control were associated negatively with FIMS maternal acceptance ratings, $r = -.39$, $p < .01$. At T3 after controlling for maternal acceptance, psychological control was not predictive of FIMS maternal acceptance. After controlling for T4 CRPBI reports of maternal acceptance, psychological control did not emerge as a significant predictor; however, maternal behavioral control negatively predicted FIMS maternal acceptance, with all of the variables accounting for 45% of the variance, $\beta = -.31$, $p < .05$; $F(2, 56) = 7.17$, $p < .05$. No CRPBI reports predicted FIMS maternal behavioral control ratings.

As predicted, CRPBI reports of maternal psychological control were associated positively with FIMS maternal psychological ratings at both T3 and T4, $r = .40$, $p < .001$ at T3; $p < .01$ at T4. CRPBI reports of maternal acceptance were associated negatively with FIMS maternal psychological control ratings at both T3 and T4, $r = -.49$, $p < .001$. In addition, CRBPI reports of maternal behavioral control were associated positively with FIMS maternal psychological control

ratings at T3, $r = .27$, $p < .05$, and T4, $r = .44$, $p < .001$. After controlling for T3 CRPBI reports of maternal psychological control, maternal acceptance negatively predicted FIMS maternal psychological control, and all of the variables accounted for 54% of the variance, $\beta = -.39$, $p < .01$; $F(2, 60) = 12.06$, $p < .001$. CRPBI reports of behavioral control did not account for unique variance when in the regression. After controlling for T4 CRPBI reports of maternal psychological control, maternal acceptance, $\beta = -.36$, $p = .01$, and behavioral control, $\beta = .28$, $p < .05$, predicted FIMS maternal psychological control, $F(3, 55) = 8.85$, $p < .001$, which together accounted for 57% of the variance.

As hypothesized, FIMS paternal acceptance was associated positively with questionnaire reports of paternal acceptance at T3, $r = .32$; $p < .05$, and T4, $r = .54$; $p < .001$. In addition, T4 CRPBI reports of behavioral control, $r = -.32$; $p < .05$, and psychological control, $r = -.47$; $p < .001$, were negatively associated with FIMS paternal acceptance. In regression analysis at T4, after controlling for CRPBI reports of paternal acceptance, CRPBI reports of paternal psychological control negatively predicted FIMS paternal acceptance, and all of the variables accounted for 60% of the variance, $\beta = -.30$; $F(2, 41) = 11.46$, $p < .001$. Although significantly correlated at the bivariate level, CRPBI reports of paternal behavioral control did not predict FIMS acceptance scores in the regression, after other parenting variables were entered.

No CRPBI reports predicted FIMS paternal behavioral control ratings at T3. Although unexpected, T4 CRPBI reports of paternal acceptance, not behavioral control, were associated negatively with paternal FIMS behavioral control ratings, $r = -.30$, $p < .05$.

As hypothesized, CRPBI reports of paternal psychological control were associated positively with FIMS paternal psychological control at T4, $r = .44$, $p < .01$; however, this was not found at T3. Although unexpected, CRPBI reports of paternal behavioral control were associated positively with FIMS psychological control at T3, $r = .34$, $p < .05$, and T4, $r = .40$, $p < .01$. In addition, at T4, CRPBI reports of paternal acceptance were associated negatively with psychological control, $r = -.45$, $p < .01$. Although significantly correlated at the bivariate level, T4 CRPBI reports of paternal acceptance and paternal behavioral control did not predict FIMS psychological control scores after controlling for psychological control.

FES family conflict ratings were associated negatively with FIMS family cohesion at T3, $r = -.29$, $p < .05$. This was not found at T4. FES reports of family conflict at T3, $r = .39$, $p < .001$, and T4, $r = .44$, $p < .001$, as well as PAC reports of family conflict at T3, $r = .44$, $p < .001$, and T4, $r = .36$, $p < .01$, were associated positively with FIMS family conflict ratings at these two time points, respectively. In addition, FES ratings of family cohesion were associated negatively with FIMS family conflict ratings at T3, $r = -.35$, $p < .01$, and T4, $r = -.28$, $p < .05$. In regression

analysis, T3 PAC reports of family conflict positively predicted FIMS family conflict rating scores, and the variables accounted for 48% of the variance, $\beta = .33$, $p < .05$; $F(2, 61) = 8.91$, $p < .001$. FES reports of family conflict and of cohesion did not account for unique variance in predicting FIMS family conflict rating scores. When entered into the regression, T4 FIMS family conflict ratings were predicted by FES reports of family conflict, $\beta = .31$, $p < .05$, and PAC reports of family conflict, $\beta = .26$, $p < .05$, together accounting for 47% of variance, $F(2, 57) = 7.92$, $p < .001$. FES ratings of family cohesion were not predictive of FIMS family conflict after controlling for FES and PAC reports of family conflict. The associations among FIMS and questionnaire ratings of cohesion and conflict were expected.

TIDM Group

It was hypothesized that parent ratings of positive expressiveness would be associated positively and negative expressiveness and parenting stress would be associated negatively with FIMS ratings of parental acceptance. Furthermore, it was expected that negative expressiveness and parenting stress would be associated positively with FIMS parental psychological control ratings. It was hypothesized that parent ratings of positive expressiveness would be associated positively and ratings of family conflict and parenting stress would be associated negatively with FIMS family cohesion ratings. Finally, it was expected that adolescent and parent ratings of family conflict, negative expressiveness, and parenting stress would be positively related to FIMS family conflict ratings.

Bivariate correlation results are presented in Table VI. As predicted, maternal SEFQ positive expressiveness was associated positively, $r = .26$, $p < .05$, and SEFQ negative expressiveness, $r = -.29$, $p < .05$, and SIPA parenting stress, $r = -.54$, $p < .001$, were associated negatively with FIMS maternal acceptance. Although unexpected, maternal, $r = -.38$, $p < .01$, and youth, $r = -.35$, $p <. 01$, conflict intensity scores were associated negatively with FIMS maternal acceptance scores. In regression analysis, the only significant predictor was SIPA parenting stress, which accounted for 29% of unique variance, $\beta = -.54$; $F(1, 51) = 20.81$, $p < .001$. No questionnaire variables were associated with FIMS maternal behavioral control scores. As hypothesized, SIPA parenting stress was associated positively with FIMS psychological control ratings, $r = .34$, $p <. 05$, but the hypothesized association between SEFQ maternal negative expressiveness and FIMS psychological control failed to reach statistical significance, $r = .23$, $p < .10$. The associations among maternal, $r = .29$, $p <. 05$, and youth, $r = .28$, $p < .05$, conflict intensity scores and FIMS psychological control ratings were unexpected. In the regression model, the only statistically significant predictor of FIMS psychological control ratings was maternal SIPA parenting stress, which accounted for 12% of variance, $\beta = .34$; $F(1, 51) = 6.79$, p

< .05. Consistent with hypotheses, SIPA parenting stress, $r = -.41$, $p < .01$, and maternal, $r = -.28$, $p < .05$, and youth, $r = -.39$, $p < .01$, conflict intensity scores were associated negatively with FIMS cohesion ratings. While the expected association between SEFQ maternal positive expressiveness and FIMS cohesion ratings failed to reach statistical significance, $r = .25$, $p < .10$, there was an expected negative correlation between SEFQ maternal negative expressiveness and FIMS cohesion ratings, $r = -.27$, $p < .05$. In the regression model, SIPA parenting stress, $\beta = -.41$; $F(1, 51) = 10.25$, $p < .01$, and youth reports of conflict intensity, $\beta = -.29$; $F(2, 50) = 8.09$, $p < .01$, were the only significant predictors of FIMS family cohesion and accounted for 17% and 8% of unique variance, respectively. As hypothesized, SIPA parenting stress, $r = .36$, $p < .01$, and youth conflict intensity, $r = .37$, $p <. 01$, were associated positively with FIMS conflict ratings, and both variables were significant predictors in the regression model with parenting stress accounting for 13% of variance, $\beta = .36$; $F(1, 51) = 7.58$, $p < .01$, and youth reports of conflict intensity accounting for 7% of variance, $\beta = .28$; $F(2,50) = 6.31$, $p < .01$. Contrary to hypothesis, SEFQ maternal negative expressiveness and maternal conflict intensity scores were not significantly associated with FIMS family conflict ratings.

Discussion

This study provides preliminary psychometric evidence for use of the FIMS with three different groups of youths and their parents. First, the FIMS may be used with adolescents with and without chronic illnesses. Given that the two chronic illness groups in the present study have very different manifestations and disease courses, the FIMS may be of value for use with other pediatric illness populations in future research. Second, there is preliminary support for the use of the FIMS with adolescents ranging in age from 12 to 17 years, and it may be used to assess dyadic (i.e., mother–youth and father–youth) as well as family level interactions. Within the SB and comparison group samples, preliminary evidence for reliability and validity was provided at ages 12–13 years and 14–15 years. Finally, there is preliminary evidence suggesting that the FIMS coding system may be used reliably with interactions observed both in home and laboratory settings.

In their review of family assessment measures, Alderfer et al. (2008) recommend researchers provide information about the reliability and validity of family assessment measures with both pediatric and general populations. The results of the present study respond to this call by extending the existing literature and providing preliminary evidence of the reliability and validity of the FIMS with both pediatric and general populations. The FIMS sub-scales used in the present analyses are theoretically based and evidence adequate internal consistency across

groups. Results across the three groups provide some evidence for hypothesized associations among the FIMS scores and self-report questionnaires with small to medium effect sizes thereby demonstrating convergent validity.

Specifically, for the SB and comparison groups, there is some evidence of convergent validity for FIMS parenting variables. The conceptually similar self-report questionnaires accounted for up to 23% of variance in predicting FIMS parental acceptance, behavioral control, and psychological control ratings. Although unexpected, a negative association between FIMS and CRPBI acceptance and psychological control scores emerged on numerous occasions. While not hypothesized, these results are consistent with the existing literature such that acceptance represents positive engagement with and support of the adolescent, yet psychological control includes attempts to interfere or inhibit an adolescent's strivings for independence (Barber & Harmon, 2002; Steinberg, 1990). For the SB and comparison groups, with the exception of T3 data for mothers in the SB group, FIMS behavioral control scores were not associated with CRPBI scores of behavioral control. Therefore, FIMS observational items may not adequately assess this construct as measured by the CRPBI. Indeed, the items on the behavioral control scales of the CRPBI tend to tap ''strictness'' as assessed in the home environment, and the items on the behavioral control subscale of the FIMS tend to tap behaviors such as ''confidence'', ''dominance'', and ''structuring of tasks'' as manifested in an observed family task. While adequate rater reliability and internal consistency were obtained with this scale, caution regarding the FIMS behavioral control scale is recommended until future work can bring some clarity to the assessment of this construct.

A consistent finding among adolescents with T1DM was the associations among the FIMS acceptance, psychological control, cohesion, and conflict ratings and maternal SIPA parenting stress scores in the hypothesized directions. Greater parenting stress was associated with observations of less acceptance, more psychological control, less family cohesion, and greater family conflict. This extends findings by Greenley et al. (2006), who found that higher parenting stress was associated with less adaptive parenting among fathers of healthy adolescents. Although bivariate correlations indicated that FIMS scores were associated with maternal positive and negative expressiveness, these relationships were not sustained in the regression analyses. The SIPA may be such a robust measure of parenting and the family emotional environment that when it is entered with other variables in a regression, it accounts for the most variance (i.e., 12–29%).

There was mixed evidence supporting convergent validity of the FIMS family cohesion and conflict scores. Hypothesized associations for family cohesion and conflict were partially

confirmed for the comparison and T1DM groups. Notably, two versions of the same measure (i.e., PAC and IC) were used to assess family members' reports of conflict in the three groups, and there were associations among the PAC and IC conflict scores and FIMS conflict scores for the comparison and T1DM groups.

Although the analyses provide preliminary support for the use of some of the FIMS scores with two pediatric populations as well as a healthy comparison group, there are several limitations that should be acknowledged. First, there was little racial, ethnic, and linguistic diversity across the three populations. Since the majority of participating parents were married, it is unclear whether and how FIMS psychometric properties might vary for single parents, blended families, or when siblings are included. While dyadic interactions were assessed in the T1DM group and triadic interactions in the SB and comparison groups, it is important to recognize that the dynamics of family interactions may vary when different combinations of family members are included in the assessment. Additionally, since different measures were used by the two laboratories to examine validity, it is not possible to directly compare results across these two settings. For the families in the T1DM group, it is unclear whether and to what extent the order of the clinic versus research study visits influenced the dynamics of the adolescent–parent interaction. The sample size precludes analyses that could examine whether a difficult clinic visit (i.e., discussion of problematic diabetes management) may have negatively impacted the family interaction. Finally, while the variability of the three samples is important for generalizing the FIMS results, specific characteristics that make the samples different (i.e., dyad vs. triad assessment; home vs. lab setting) are nested within samples, and therefore it is not possible to separate their unique influence within the present analyses.

Despite these limitations, the results are encouraging for the use of the majority of the FIMS variables with pediatric populations. An important extension of the literature would be to examine the clinical utility and value of the FIMS (Alderfer et al., 2008). For instance, it was beyond the scope of the present paper to examine how the FIMS may be related to illness characteristics (e.g., illness severity, biological markers). Nonetheless, this information may be valuable to clinicians in determining which family variables are amenable to intervention and may impact health outcomes (Butler et al., 2008). Preliminary evidence of the reliability and validity of the FIMS provides a foundation for future use of this measure with various pediatric and healthy populations.

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Appendix

Table I: FIMS Codes with Individual Items

FIMS Codes	FIMS Items
Parental acceptance	Listens to others (M, F)
	Humor and laughter (M, F)
	Warmth (M, F)
	Anger[a] (M, F)
	Supportiveness (M, F)
Parental behavioral control	Overt power/Dominance (M, F)
	Confidence in stating opinions (M, F)
	Parental structuring of task (M, F)
	Nature of parental control: Authoritarian (M, F)
	Nature of parental control: Permissive[a] (M, F)
Parental psychological control	Pressures others to agree (M, F)
	Tolerates differences and disagreements[a] (M, F)
	Nature of parental control: Democratic[a] (M, F)
	Nature of parental control: Overprotective (M, F)
	Receptive to statements made by others[a] (M–Y, F–Y, M–F, F–M)
Family cohesion	Requests input from other family members (M–Y, F–Y, Y–M, Y–F, M–F, F–M)
	Comfort level during interaction (M, F, Y)
	Involvement in the task (M, F, Y)
	Parents present a united front
	Parental promotion of dialogue and collaboration (M, F)
	General family atmosphere: Disengaged[a]
	General family atmosphere: Openness, comfortableness, optimism
	General family atmosphere: Able to reach an agreement/solution
Family conflict	Level of conflict within dyads (M–Y, F–Y, M–F)
	Frequently disagrees with others (M, F, Y)
	Attempted resolution of issues[a] (M, F, Y)

[a]Indicates reverse scored.

M, Mother; F, Father; Y, Youth.

Table II: Participant Demographic Characteristics

	SB		Comparison		T1DM	
Characteristic	*M (SD)*	*n* (%)	*M (SD)*	*n* (%)	*M (SD)*	*n* (%)
Child gender: male		32 (50.80)		36 (54.50)		29 (50)
Child ethnicity						
Caucasian		46 (82.10)		55 (87.30)		52 (89.66)
Other		10 (17.90)		8 (12.70)		6 (10.34)
Maternal age	41.98 (4.93)		41.82 (4.93)		44.62 (5.76)	
Paternal age	44.47 (5.32)		44.98 (5.90)		–	
Marital status						
Two-parent intact		45 (72.60)		47 (69.10)		47 (81.03)

Note. SB = Spina bifida; T1DM = Type 1 diabetes mellitus

Table III: FIMS Interrater and Scale Reliabilities

FIMS scales	Maternal scores										Paternal scores							
	Scale-level rater reliability					Internal consistency reliability					Scale-level rater reliability				Internal consistency reliability			
	T1DM	SB		COMP		T1DM	SB		COMP		SB		COMP		SB		COMP	
		T3	T4	T3	T4		T3	T4	T3	T4	T3	T4	T3	T4	T3	T4	T3	T4
Acceptance	.79	.77	.78	.65	.81	.76	.77	.82	.79	.74	.87	.59	.62	.67	.82	.75	.69	.77
Behavioral control	.90	.74	.60	.65	.63	.76	.78	.59	.67	.82	.79	.77	.87	.71	.82	.86	.80	.86
Psychological control	.86	.64	.66	.53	.68	.78	.73	.69	.76	.71	.59	.68	.63	.58	.67	.73	.62	.58
	Family-level scores																	
Cohesion	.87	.86	.78	.81	.86	.88	.84	.79	.82	.84								
Conflict	.87	.46	.79	.65	.75	.73	.68	.84	.80	.82								

T1DM = Type 1 diabetes mellitus; SB = Spina bifidal; COMP = Comparison group.

Table IV: Pearson Correlations among FIMS and Questionnaire Variables for the SB Group

Questionnaire variables	FIMS variables															
	Maternal scores						Paternal scores						Family-level scores			
	Acceptance		Behavioral control		Psychological control		Acceptance		Behavioral control		Psychological control		Cohesion		Conflict	
	T3	T4	T3	T4	T3	T4	T3	T4	T3	T4	T3	T4	T3	T4	T3	T4
Acceptance[a]	.10	.14	–.03	.05	–.04	–.06	.03	.24	.04	–.11	–.14	–.21				
Behavioral control[a]	–.26	–.26	**.35****	.13	.40**	.41**	.02	–.25	–.01	.30	.09	.51**				
Psychological control[a]	–.31*	–.34*	.25	.28*	**.37****	**.41****	–.24	–.29	.09	.35	**.36***	**.55*****				
Family cohesion[b]													.00	–.27	.01	.16
Family conflict[b]													–.07	–.18	.05	.19
Family conflict intensity[c]													.00	.04	.18	.12

Note. Bold indicates which results support hypotheses.

[a]Child Report of Parenting Behavior Inventory.

[b]Family Environment Scale.

[c]Parent-Adolescent Conflict Scale.

*$p < .05$; **$p < .01$; ***$p < .001$.

Table V: Pearson Correlations among FIMS and Questionnaire Variables for the Comparison Group

Questionnaire variables	FIMS variables															
	Maternal scores						Paternal scores						Family-level scores			
	Acceptance		Behavioral control		Psychological control		Acceptance		Behavioral control		Psychological control		Cohesion		Conflict	
	T3	T4	T3	T4	T3	T4	T3	T4	T3	T4	T3	T4	T3	T4	T3	T4
Acceptance[a]	**.51*****	**.35****	–.04	.16	–.49***	–.49***	**.32***	**.54*****	–.06	–.30*	–.28	–.45**				
Behavioral control[a]	–.24	–.39**	.03	–.05	.27*	.44***	–.17	–.32*	.27	–.16	.34*	.40**				
Psychological control[a]	–.39***	–.39**	–.06	–.20	**.40*****	**.40****	–.12	–.47***	.06	–.12	.25	**.44****				
Family cohesion[b]													.06	.19	–.35**	–.28*
Family conflict[b]													–.29*	–.23	**.39*****	**.44*****
Family conflict intensity[c]													–.16	–.08	**.44*****	**.36****

Note. Bold indicates which results support hypotheses.

[a]Child Report of Parenting Behavior Inventory.

[b]Family Environment Scale.

[c]Parent–Adolescent Conflict Scale.

**p* < .05; ***p* < .01; ****p* < .001.

Table VI: Correlations among FIMS and Questionnaire Variables for the T1DM Group

	FIMS variables				
	Maternal scores			Family-Level Scores	
Questionnaire variables	Acceptance	Behavioral control	Psychological control	Cohesion	Conflict
Positive expressiveness[a]	**.26***	.16	–.05	.25	–.13
Negative expressiveness[a]	**–.29***	–.24	.23	–.27*	.21
Maternal conflict intensity[b]	–.38**	.06	.29*	**–.28***	.24
Youth conflict intensity[b]	–.35**	–.15	.28*	**–.39****	**.37****
Total parenting stress[c]	**–.54*****	–.10	**.34***	**–.41****	**.36****

Note. Bold indicates which results support hypotheses.

[a]Self-Expressiveness in the Family Questionnaire.

[b]Issues Checklist.

[c]Stress Index for Parents of Adolescents.

*$p < .05$; **$p < .01$; ***$p < .001$.