Parent Report of Mealtime Behavior and Parenting Stress in Young Children With Type 1 Diabetes and in Healthy Control Subjects

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OBJECTIVE — This study assessed parent report of mealtime behavior and parenting stress in preschoolers with type 1 diabetes. It was hypothesized that children with type 1 diabetes would be seen as exhibiting more mealtime behavior problems and that their parents would evidence greater parenting stress when compared with healthy subjects. It was also hypothesized that report of mealtime behavior problems would be positively correlated with parenting stress.

RESEARCH DESIGN AND METHODS — A total of 40 children (aged 1–6 years) with type 1 diabetes were recruited from a pediatric hospital. Another 40 children matched for age, sex, marital status, and socioeconomic status were used as control subjects. Reliable and valid parent report measures, such as the Behavioral Pediatrics Feeding Assessment Scale and the Parenting Stress Index, were used for data collection.

RESULTS — Parents of children with type 1 diabetes reported more behavioral feeding problems than parents of healthy control subjects. Additionally, parents of children with type 1 diabetes reported higher frequencies of parenting behaviors associated with poor nutritional intake and a greater number of parenting problems concerning mealtimes when compared with parents of healthy control subjects. Parents of children with type 1 diabetes also reported higher stress levels than parents of control subjects. A moderate relationship between mealtime behavior problems and general parenting stress was observed for families coping with type 1 diabetes.

CONCLUSIONS — Mealtime problems reported in preschool children with type 1 diabetes are appropriate targets for behavioral intervention. Behavioral observation techniques and training in child behavior management skills should be used in future research aimed at assessing and treating barriers to effective nutrition management in young children with type 1 diabetes.

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Type 1 diabetes is one of the most common chronic illnesses in childhood, and there is increasing evidence that the incidence is on the rise, particularly among young children (1,2). The behavioral science literature has examined factors (e.g., adjustment, adherence) relevant to type 1 diabetes (3) and demonstrated that behavioral problems are significant concerns for families coping with this disease (4,5). To date, this literature has focused primarily on school age and adolescent populations. There is insufficient understanding regarding the impact of type 1 diabetes on children in early development (under age 7 years) (6).

One of the more demanding disease-specific tasks for families of children with type 1 diabetes is nutrition management. The goal of nutrition management is to develop an individualized meal plan based on the child's appetite, food preferences, and lifestyle that is nutritionally adequate and maintains normal growth and development (7,8). Families are instructed to provide the child with a specific amount of foods containing carbohydrates, distributed in regular, nutritionally balanced meals and snacks throughout the day (9). Younger children may have a more difficult time adhering to a specific dietary regimen because of developmental issues (e.g., increased insulin sensitivity, the child's limited cognitive ability, transient food preferences, and emotional lability) (6,10,11). The increased risk of hypoglycemia and the resultant potential for neuropsychological impairments are also important reasons to examine disease management challenges such as nutrition in young children (12). In the only study to focus solely on preschoolers with type 1 diabetes, Wysocki et al. (6) found that parents reported mealtime problems as some of the more challenging aspects of diabetes care (e.g., "My child leaves the table during meals" and "My child dawdles a long time before coming to the table"). As our prior work in cystic fibrosis has shown (13–18), research examining the impact of nutrition management on families and young children with type 1 diabetes could serve to inform the development of behavioral interventions designed to make such disease-specific tasks more manageable for this understudied population.

The purpose of this study was to as-

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Abbreviations: BPFAS, Behavioral Pediatrics Feeding Assessment Scale; CCHMC, Cincinnati Children's Hospital Medical Center; MANOVA, multivariate analysis of variance; PDC, Pediatric Diabetes Center; PSI, Parenting Stress Index; SES, socioeconomic strata.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

sess parent report of mealtime behavior problems and general parenting stress in a sample of preschoolers with type 1 diabetes as compared with healthy control subjects. It was hypothesized that *1*) children with type 1 diabetes would be characterized by more problematic mealtime behavior than non–chronically ill children, *2*) parents of children with type 1 diabetes would report greater levels of general parenting stress than parents of non–chronically ill children, and *3*) parent report of mealtime behavior problems and general parenting stress would be positively correlated.

RESEARCH DESIGN AND METHODS

— A total of 40 children with type 1 diabetes and their primary caregivers were recruited from the Pediatric Diabetes Center (PDC) at Cincinnati Children's Hospital Medical Center (CCHMC), a large pediatric tertiary care center located in the Midwest. CCHMC is the only inpatient pediatric facility in a tristate region, and the population served by the PDC is representative of North America. Thus, the recruitment pool for the current study represented nearly every case of pediatric type 1 diabetes within a 50-mile radius of the medical center. Inclusion/exclusion criteria for the study were as follows: confirmed diagnosis of type 1 diabetes of ≥6 months duration; no other disease/condition or medication known to affect growth; child aged <84 months; family speaks English as a primary language; and child had attended a PDC clinic visit within the last 12 months. As part of standard care, all families of children with type 1 diabetes were given the same nutritional guidelines, had equal access to a nutritionist, and were taught the principles of carbohydrate counting. The sample was comprised of 22 (55%) male and 18 female subjects ranging in age from 1 to 6 years (4.6 ± 1.2 years, means ± SD); illness duration averaged 23.3 ± 12.7 months. The sample was predominantly Caucasian (85%), and most children (85%) were living with both parents (i.e., married couples). The primary caregiver who participated in the assessment was the child's mother in 98% of the cases. The majority (86%) of families fell within the top three (i.e., highest) socioeconomic strata (SES) on the Hollingshead four-factor index of social position (A.B. Hollingshead, unpublished manuscript, 1975).

Healthy comparison subjects were 40 children without a history of chronic illness and their primary caregivers recruited from the surrounding community. Control children were selected for inclusion in the study based on the following matching criteria: sex, ethnicity, age within 3 months, and SES score within one strata. The control group was comprised of 22 (55%) male and 18 female subjects ranging in age from 1 to 6 years (4.5 ± 1.2 years). The control group was predominantly Caucasian (90%), and most children (88%) were living with both parents (i.e., married couples). The primary caregiver who participated in the assessment was the child's mother in 95% of the cases. The majority (98%) of the families fell within the top three (i.e., highest) SES. No specific nutritional guidelines were followed by control families.

Procedures

Children with type 1 diabetes and their primary caregivers were selected for study recruitment from the PDC patient database. A total of 59 families of children with type 1 diabetes were identified as eligible for study participation. Attempts to contact families were made through a letter from the PDC medical director and nurse practitioner and a follow-up telephone call from the research project coordinator. Altogether, 53 families were successfully contacted and asked to participate in this study. Of the families contacted, 96% ($n = 51$) agreed to participate in the project. One family withdrew prematurely from the study due to the death of a caregiver, thus 94% ($n = 50$) of the eligible families that were contacted completed the research protocol. This study reports on 40 subjects who were matched with a non–chronically ill control subject. The 40 matched and 10 unmatched subjects with type 1 diabetes did not differ on any demographic, physiological, or outcome variables (age, sex, marital status, anthropometrics, HbA_{1c}, and feeding and stress questionnaires), with the exception of socioeconomic status, which was lower for the unmatched subjects.

Healthy comparison control subjects were recruited from the local community. Flyers explaining the study were distributed to community pediatricians and medical personnel within CCHMC. Parents were asked to contact the study coordinator if interested in participating. If the control child met the matching criteria for a type 1 diabetes subject, the family was asked to participate in the study.

Caregiver consent was obtained before the assessment. The assessment protocol was approved by the Institutional Review Board of CCHMC. During a scheduled PDC visit (type 1 diabetes subjects) or a scheduled research visit (comparison subjects), a trained research assistant obtained each participating child's height and weight using a standard protocol. Primary caregivers completed the questionnaire measures at this visit with assistance from trained personnel. Assessment measures took ~40–50 min to complete, and each family received $20 compensation for their time.

Anthropometric data (i.e., height and weight) were evaluated for each of the participating children using ANTHRO (version 1.01), a software program for calculating pediatric anthropometry (19). Weight was measured to the nearest 0.1 kg using a digital Scaletronic Scale (Wheaton, IL). Height/length was measured to the nearest millimeter using a Holtain stadiometer (Crymych, U.K.). The mean weight for age and height for age *Z* scores for the type 1 diabetes group and the healthy control group were <1. For the type 1 diabetes sample, HbA_{1c} measured within the 3 months preceding the date of the child's anthropometric measurements (mean 83 days) was obtained via medical chart review. The average HbA_{1c} level was 8 ± 1.3 (range 5.7–12.4), with 70% having a level <8.5.

Instruments

Behavioral Pediatrics Feeding Assessment Scale. The Behavioral Pediatrics Feeding Assessment Scale (BPFAS) is a reliable and valid 35-item parent report questionnaire that assesses parent and child behaviors associated with poor nutritional intake (20). The first 25 scale items are focused specifically on child behaviors, and the last 10 items focus on parents' feelings and strategies for managing feeding problems. Items are phrased in both the positive (e.g., my child will try new foods) and negative (e.g., my child whines or cries at feeding time) directions. For each question, the parent is requested to indicate how often the particular behavior occurs, using a five-point Likert scale (1 = "never" to 5 = "always"). Additionally, the parent is asked to indicate whether each particular behavior is problematic (yes/no). This

Table 1—*Behavioral pediatrics feeding assessment scale and parenting stress index*

Questionnaire Variable	Diabetes (n = 40)	Control (n = 40)
BPFAS		
Child behavior — problems*	3.8 ± 4.0	1.8 ± 2.3
Child behavior — frequency†	50.0 ± 11.0	45.8 ± 7.7
Parents' feelings/strategies — problems‡	1.8 ± 2.4	0.6 ± 1.6
Parents' feelings/strategies — frequency§	20.6 ± 5.4	16.6 ± 3.6
PSI		
Child score	100.9 ± 22.0	89.1 ± 14.8
Parent score	117.2 ± 24.1	106.5 ± 20.0
Total score	218.1 ± 43.4	195.5 ± 31.1

Data are means ± SD. *i.e., number of behaviors rated "yes"; †i.e., sum of five-point Likert scores; ‡i.e., number of behaviors rated "yes"; §i.e., sum of five-point Likert scores.

scale yields four scores: Child Behavior—Frequency (i.e., sum of five-point Likert scores; range 25–125), Child Behavior—Problems (i.e., number of behaviors rated "yes"; range 0–25), Parents' Feelings/Strategies—Frequency (i.e., sum of five-point Likert scores; range 10–50), Parents' Feelings/Strategies—Problems (i.e., number of behaviors rated yes; range 0–10). Frequency scores reflect how often parent and child behaviors occur. Problem scores reflect the number of behaviors the parents consider to be feeding problems. Higher scores are suggestive of maladaptive feeding behaviors (note: positively phrased items are reverse-scored).

Parenting Stress Index. The Parenting Stress Index (PSI) is a reliable and valid 120-item parent report questionnaire that assesses stressful parent-child interactions (21). The first 101 questions (five-point Likert scale format) focus on stress associated with child and parent characteristics, and the last 19 items (yes/no format) assess the level of situational/demographic life stress. This instrument provides three major measures of stress: parent factors (parent score), child factors (child score), and overall stress (total stress score). PSI scores are the sum of Likert scale items for parent, child, or all items, respectively. Higher scores are indicative of greater stress. Form 6 of the PSI was used.

RESULTS

Demographic variables

The subjects with type 1 diabetes and the control subjects were compared on all sociodemographic variables (age, sex, race, marital status, and socioeconomic status). The means for chronological age (continuous variable) were examined by Student's t test, and χ^2 analyses were used to evaluate the comparability of the groups for the categorical variables (sex, race, marital status, and socioeconomic status). No differences were found for any of the demographic variables ($P > 0.05$ for all).

Mealtime behavior problems

To analyze group differences for mealtime behaviors (hypothesis 1), we used multivariate analysis of variance (MANOVA) with each of the four BPFAS scales (child problem score, child frequency score, parent problem score, and parent frequency score) as the dependent variables and children's diagnostic status (type 1 diabetes group and healthy comparison group) as the independent variable. Table 1 shows a summary of BPFAS scores. The results of the one-way MANOVA for feeding behavior problems revealed a statistically significant difference for parents' reports of feeding behavior problems ($F[4,75] = 4.6, P = 0.002$). Separate univariate ANOVAs performed for each of the dependent variables revealed statistically significant differences for number of child behavior problems ($P = 0.007$), number of parent problems ($P = 0.011$), and frequency of occurrence of parent problems ($P = 0.0001$). The univariate analysis for frequency of occurrence of child behavior problems approached statistical significance ($P = 0.051$). Without exception, parents of children with type 1 diabetes reported higher problem and frequency scores on the BPFAS when compared with healthy control subjects.

To identify what mealtime behaviors parents of children with type 1 diabetes reported as problematic, the percentage of parents reporting each BPFAS item as a problem was examined (Table 2). Similar to prior research conducted with the BPFAS in young children with cystic fibrosis (20), the percentages for the type 1 diabetes group were compared with the control group using χ^2 analyses. All significant differences (Table 2) were the result of the type 1 diabetes group's endorsing items as being more problematic than did the control group.

Parenting stress

To analyze group differences for parenting stress (hypothesis 2), we performed a MANOVA using the total score and parent and child subscales of the PSI as the dependent variables and children's diagnostic status (type 1 diabetes group and healthy comparison group) as the independent variable. Table 1 shows a summary of PSI scores. The results of the one-way MANOVA revealed a statistically significant difference for parents' reports of parenting stress ($F[2,77] = 4.0, P = 0.022$). Separate univariate ANOVAs performed for the dependent variables revealed statistically significant differences for the total score ($P = 0.009$), parent subscale ($P = 0.006$), and child subscale ($P = 0.034$). Without exception, parents of children with type 1 diabetes reported higher stress scores on the PSI when compared with healthy control subjects.

Correlations between parenting stress and mealtime behavior problems

For both the type 1 diabetes and control samples, the relationship between parenting stress and mealtime behavior problems was examined with Pearson product-moment correlations. To reduce the number of correlations used to test hypothesis 3, one measure of parenting stress (PSI total score) and two measures of mealtime behavior (BPFAS child and parent problem scores) were examined. The PSI total score correlated 0.48 ($P < 0.01$) with both the BPFAS child and parent problem scores for the type 1 diabetes sample and 0.37 ($P < 0.02$, child) and 0.19 (NS, parent) for the control sample. These data support a moderate and positive association between parenting stress and parents' perceptions of behavioral feeding problems for both samples.

Table 2—*Comparison of BPFAS items considered problems for type 1 diabetic and control subjects*

BPFAS questions (item no.)	Diabetes (% "yes")*	Control (% "yes")	χ^2†
Child			
1. Eats fruits	13	3	—
2. Has problems chewing food	5	3	—
3. Enjoys eating	25	3	8.54‡
4. Chokes or gags at mealtime	5	3	—
5. Will try new foods	26	23	—
6. Eats meat and/or fish	8	10	
7. Takes longer than 20 minutes to finish a meal	33	3	12.47§
8. Drinks milk	10	5	—
9. Comes readily to mealtime	20	3	6.14‖
10. Eats junky snack foods but will not eat at mealtime	18	13	—
11. Vomits just before, at, or just after mealtime	0	3	—
12. Eats only ground, strained, or soft food	0	3	—
13. Gets up from table during meal	31	25	—
14. Lets food sit in his/her mouth and does not swallow it	10	3	—
15. Whines or cries at feeding time	23	10	—
16. Eats vegetables	25	18	—
17. Tantrums at mealtimes	13	5	—
18. Eats starches	10	0	4.21‖
19. Has a poor appetite	18	3	5.00‖
20. Spits out food	5	5	—
21. Delays eating by talking	20	15	—
22. Would rather drink than eat	20	5	4.11‖
23. Refuses to eat meals but requests food immediately after meal	18	10	—
24. Tries to negotiate what he/she will and will not eat	23	15	—
25. Has required nasogastric (ng) feeds to maintain proper nutritional status	0	3	—
Parent			
26. I get anxious and/or frustrated when feeding my child	21	10	5.27‖
27. I coax my child to get him/her to take a bite	20	15	—
28. I use threats to get my child to eat	18	13	—
29. I feel confident my child gets enough to eat	25	5	6.28‖
30. I feel confident in my ability to manage my child's behavior at mealtime	20	5	4.11‖
31. If child doesn't like what is served, I make something else	28	5	7.44‡
32. When child refused food, I've put food in mouth by force	5	0	—
33. I disagree with other adults about how to feed my child	10	3	—
34. I feel my child's eating pattern hurts her/his general health	23	8	—
35. I get so angry at mealtimes that it takes while to calm	8	0	—

*% "yes" is percentage of parents reporting that the particular BPFAS item was a problem for them; †significant items only are listed; ‡$P < 0.01$; §$P < 0.001$; ‖$P < 0.05$.

Relationship between parent report measures and physiological parameters

Although the result was preliminary because of the relatively small sample, for the type 1 diabetic children, there was a trend in the relationship between parent reports of mealtime behavior problems and child's growth status (i.e., weight for height percentile), with correlations near −0.30 (P values ranged from 0.066 to 0.057). Such trends were not found for HbA_{1c} levels in this study (r values ranged from 0.03 to 0.19), possibly due to the lack of variability on this physiological measure. In addition, relationships between parent stress and growth (r values ranging from 0.02 to 0.05) and parent stress and metabolic control (r values ranging from −0.15 to −0.16) were not significant.

CONCLUSIONS — This study demonstrated the difficulties that nutrition management and, specifically, mealtimes present for parents of young children with type 1 diabetes. It focused on the largest group of preschool children with type 1 diabetes to have been systematically assessed for mealtime behavior problems and general parenting stress associated with the parent-child relationship. Sound recruitment methodology provided a representative type 1 diabetes sample and equivalent healthy comparison group from a large tristate geographic region in the Midwest. Each of the three hypotheses was supported, indicating that parents of young children with type 1 diabetes perceive mealtime behaviors as more problematic, report more concerns about their abilities to manage mealtime behavior, and experience more overall parenting stress than parents of young children without a chronic illness. In addition, parents of young children with type 1 diabetes that reported higher parenting stress levels also reported more problems with child mealtime behaviors and concerns about their mealtime behavior management abilities. The findings have important implications because nutrition management is a cornerstone of type 1 diabetes care, and young children with type 1 diabetes are understudied in clinical research.

The specific mealtime behaviors that were reported as more problematic for families of young children with type 1 diabetes included "the child takes longer than 20 min to finish a meal," "does not come readily to mealtime," "would rather drink than eat," "has a poor appetite," "does not eat starches," and "does not enjoy eating." It is possible that the specific child behaviors reported by parents (such as "child has a poor appetite" or "would rather drink than eat") might directly impact diabetes control and thus leave the parent little alternative but to make another meal to provide adequate and timely food intake and avert hypoglycemia. Indeed, parents in the type 1 diabetes group more often reported that if their child did not like what was being served, they would make something else. However, such parent-child interactions, though potentially successful in the short

term, can negatively impact the parent's authority and overall ability to ensure consistent dietary adherence and lead to longer mealtimes. To understand further how mealtimes impact parent-child interactions, daily mealtime management in young children with type 1 diabetes must be investigated via systematic behavioral observation assessment studies. In these types of studies, actual mealtime behaviors of young children would be observed and compared with behaviors of young children who do not have specific nutrition management demands and/or who have other chronic illnesses that involve dietary management. Our prior work with children with cystic fibrosis (13–15) demonstrates the utility of such behavioral observation studies in determining appropriate targets for behavioral intervention.

A number of the mealtime behaviors reported by parents of young children with type 1 diabetes (e.g., "does not come readily to mealtime," "meals >20 min") are similar to those noted as problems by families of children with cystic fibrosis (20). Our prior work indicates that such behaviors may be amenable to change via behavioral interventions (17,18). Specifically, helping families establish rules and consequences for meal duration and staying at the table may be needed. Teaching parents how to actively praise and reward positive food choices and consistent eating throughout the meal may be indicated. Giving parents ways to actively ignore when their child is engaged in noneating behaviors while at the meal table (e.g., talking to delay eating, playing with utensils instead of eating) may be necessary.

Other behaviors that may be specific to the type 1 diabetes diet regimen (e.g., "parents make alternative foods when child does not like meal" and "child would rather drink than eat") provide additional targets for behavioral intervention. For example, parents may need a consistent and proactive plan to address a child's refusal to eat what is served and to prevent having to make an alternative meal halfway through or near the end of the mealtime. A behavioral intervention could be designed to teach parents to begin each meal with a set of two to three positive food choices. One meal would be the food prepared that evening for the child, and the other one to two choices could be quick-to-make yet nutritious foods that the child has previously agreed are preferred choices when s/he does not wish to eat the prepared meal. The parent would praise the child for choosing in a timely fashion and would use praising and ignoring skills during the meal to promote the child's positive eating. The child could earn stickers and rewards for meeting the choice and food intake goals for that meal. This intervention would directly target decreasing the coercive interactions that likely lead to the parent making alternate meals near the end of mealtime or "giving in to the child" when all else fails. Such interventions might also provide parents with more confidence and address their concerns about being anxious or frustrated when feeding their child.

In addition to the potential implications for addressing eating behaviors in young children with type 1 diabetes, this study suggests that nutrition management demands may be related to decreased parental confidence and increased parental stress. Mealtime behaviors were found to impact parents' sense of confidence about taking good care of their child. Specific concerns reported as more problematic for families of young children with type 1 diabetes included "getting anxious and/or frustrated when feeding my child," "not feeling confident that my child gets enough to eat," and "not feeling confident in my ability to manage my child's behavior at mealtime." Behavioral observation studies would identify behaviors that should be targets for intervention in young children with type 1 diabetes. Future research could also investigate the impact of behavioral interventions designed from these observational studies on parents' level of confidence and skill in nutrition management.

Finally, the findings of this study serve to underscore the importance of examining the relationship between mealtime interaction patterns and metabolic (e.g., severe hypoglycemia) and other health outcomes (e.g., normal growth and development) in young children with type 1 diabetes. Clearly, the challenges of mealtimes are notable enough to parents to warrant further behavioral assessment research and the development of interventions to help families feel more successful with nutrition management. Whether these challenges and families' behavioral responses to them impact disease status and outcomes is not clear. To test these relationships, large multisite studies will be necessary to have the statistical power to model the potentially complex interactions between nutrition management goals, mealtime behaviors, parent responses at mealtime, child growth, and child metabolic status.

There are a number of limitations to this study. First, the outcome variables examined in this study were measured indirectly using self-report instruments. Although the instruments selected for this study are psychometrically sound, self-report measures in general are vulnerable to subject bias. Future investigations should use behavioral observation techniques to evaluate family functioning in the context of disease-management tasks. Such assessment strategies will provide more specific data regarding parent-child interactions at mealtimes and parenting stress as it relates to the management of type 1 diabetes. Second, the report of a single source for both constructs examined may have inflated the relationships found in this study. Indeed, the exclusive report of a primary caregiver cannot fully capture the complex nature of parent-child interactions or quantify the impact of type 1 diabetes disease management tasks on parent-child relationships. Although the moderate and positive correlation between mealtime behavior problems and general parenting stress found in this study provides a basis for further investigation of these variables, multiple sources and multiple assessment techniques (including assessment of additional child variables, such as temperament) are needed in future studies. Finally, although the sample of young children with type 1 diabetes in this study was representative of the available population, the families were mostly middle to upper SES, married, and white. Although these demographic variables were not found to relate to the outcome measures, the relatively small sample size and lack of diversity of our sample limits the generalizability of the findings and suggests a need to conduct multisite studies with large and diverse samples.

Despite these limitations, the results of this study support the development of a longitudinal hypothesis-driven research program targeting nutrition management in young children with type 1 diabetes and their families. It is clear that families perceive mealtimes and nutrition management as challenging. Future work

should attempt to better understand these challenges, focus on helping families effectively manage them, and examine the interrelationships between nutrition management, behavioral factors, and health status and outcomes in this understudied population.

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