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Pediatric Parenting Stress and Its Relation to Depressive Symptoms and Fear of Hypoglycemia in Parents of Young Children with Type 1 Diabetes Mellitus

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Abstract

Parents of young children with type 1 diabetes (T1DM) maintain full responsibility for their child's daily diabetes self-care and thus may be vulnerable to experiencing parenting stress. This study examined several psychological correlates of pediatric parenting stress in parents of young children with T1DM. Parents of 39 young children with T1DM (ages 2–7 years) completed measures of pediatric parenting stress, mealtime behavior problems, depressive symptoms, and fear of hypoglycemia. For parents of young children, higher stress frequency and difficulty were associated with higher parental depressive symptoms and fear. Regression analyses identified that 58% of the variance in stress frequency was associated with parental depressive symptoms. For stress difficulty, 68% of the variance was associated with parental depressive symptoms and fear. Pediatric parenting stress is common in parents of young children with T1DM. Stress and the psychological correlates measured in this study are amenable to intervention and should be regularly assessed in parents of young children with T1DM.

Keywords

Type 1 diabetes; Parenting stress; Young children; Depression

Introduction

Type 1 diabetes (T1DM) is a common childhood illness that involves a rigorous daily self-care regimen which includes insulin administration, blood glucose monitoring, dietary

management, and exercise (Silverstein et al., 2005). Based on current clinical care guidelines for children less than 7 years old, it is recommended that parents assume the burden of daily diabetes self-care (Silverstein et al., 2005). However, when working with young children, completing these daily self-management tasks can present many challenges (Silverstein et al., 2005; Sullivan-Bolyai, Deatrick, Gruppuso, Tamborlane, & Grey, 2002). Developmentally, young children lack a full understanding of their disease and often seek independence in their daily activities, which may make it challenging for parents to complete necessary diabetes-care activities (Golden, Russell, Ingersoll, Gray, & Hummer, 1985; Patton, Dolan, & Powers, 2006a; Sullivan-Bolyai et al., 2002). Physiologically, young children are also more susceptible to wide fluctuations in blood glucose levels because of their unpredictability in food intake and exercise patterns, greater sensitivity to insulin, and because of limitations in the minimum insulin dose that can be measured via the traditional syringe mode of administration (Golden et al., 1985; Silverstein et al., 2005). All of these factors combined may impact parents' functioning and their perception of stress.

In past research, parenting stress was examined in a sample of young children with T1DM and matched controls (Powers et al., 2002). In this early study, young children with T1DM all followed a conventional, two shot per day insulin regimen. Parenting stress was measured using the Parent Stress Index (PSI), which is a general measure of parenting stress and does not focus specifically on the experiences of having a child with a chronic illness. The results found that for general parenting stress, parents of young children with T1DM reported higher stress levels than parents of control children (Powers et al., 2002).

The current study extends the previous findings by now focusing on pediatric parenting stress and the potential correlates of this stress in a sample of parents of young children with T1DM. Pediatric parenting stress is a construct used to define stress specifically associated with raising a child with a chronic illness (Streisand, Braniecki, Tercyak, & Kazak, 2001). It is separate from general parenting stress because of its inclusion of items specific to child health, parental responsibility and perceptions of burden, and parental adaptation to the illness (Streisand et al., 2001). Pediatric parenting stress has been measured previously in parents of school-age children with T1DM and parents of children newly diagnosed with T1DM (Streisand et al., 2008; Streisand, Swift, Wickmark, Chen, & Holmes, 2005). However, there has been only limited research in parents of young children with T1DM (Mitchell et al., 2009; Monaghan, Hilliard, Cogen, & Streisand, 2009).

It is important to study pediatric parenting stress in young children with T1DM as stress may impact parents' ability to care for their child (Streisand et al., 2005). This notion is consistent with Kazak's social-ecological framework for chronic illness which predicts that child illness will impact parents' response to stress and their functioning (Kazak, 1989). Research examining correlates of pediatric parenting stress is also necessary to help in the development of targeted interventions for parents of young children with T1DM to reduce parents' stress levels and improve their overall functioning. For this manuscript, a model of psychosocial correlates of pediatric parenting stress was built based on correlates that are amenable to intervention and the available literature. Specifically, three possible correlates were selected: parental fear of hypoglycemia, depressive symptoms, and parental perceptions of mealtime problems (Fig. 1).

Fear of hypoglycemia in parents of young children with T1DM has been documented in several studies (Grey, 2009; Monaghan et al., 2009; Patton, Dolan, Henry, & Powers, 2007, 2008) and linked to higher blood glucose levels in young children in at least one study (Patton et al., 2007). Two studies have also linked fear of hypoglycemia to pediatric parenting stress. In the first study, focused on school-age youth with T1DM, Streisand et al. (2005) found parental greater fear of hypoglycemia to be positively associated with both

parental perceptions of parenting stress difficulty and frequency. Likewise, in a sample of father's of young children with T1DM, Mitchell et al. (2009) found greater fear of hypoglycemia correlated positively with fathers' perceived difficulty with parenting stress. While the available research suggests that parental fear of hypoglycemia is common in parents of young children with T1DM and a correlate of parenting stress, more research is needed to examine fear in a model containing other factors known to correlate with parenting stress as these data could help to prioritize intervention strategies.

A recent study suggests that the rate of depressive symptoms in mothers of young children with T1DM is consistent with rates reported for mothers of other chronically ill children (Grey, 2009). Thus, given the responsibility parents of young children bear for diabetes management, the experience of parental depressive symptoms is also expected to have an effect on their perceptions of parenting stress. Specifically, two studies have found a positive correlation between parental depressive symptoms and pediatric parenting stress in children with T1DM (Mitchell et al., 2009; Streisand et al., 2005). Similarly, examining parental perceived problems coping with stress related to diabetes management, Grey (2009) found a positive correlation between coping problems and maternal depressive symptoms. Interestingly, this study also examined the association between maternal depressive symptoms and young children's metabolic control and found no relation. Within the larger diabetes literature, studies correlating maternal depressive symptoms and children's metabolic control have produced mixed results (Grey, 2009). Thus, it is possible maternal depressive symptoms may only affect children's metabolic control indirectly, such as via increased parental monitoring or stress (Grey, 2009). Understanding how parenting stress and maternal depressive symptoms may be related in parents of young children with T1DM can help with the development of interventions to decrease parenting stress and their experience of depressive symptoms.

In line with understanding how parental perceptions of diabetes control may impact their perceptions of parenting stress and psychological functioning, it is important to determine the role played by child behavior. Looking at families of young children with T1DM, only one study has specifically examined the association between child behavior and pediatric parenting stress (Mitchell et al., 2009). This study recruited a sample of fathers of young children with T1DM and using maternal reports on the Eyberg Child Behavior Inventory, a general measure of child behavior, found a positive correlation between difficult child behavior and fathers' perceptions of difficulty related to pediatric parenting stress (Mitchell et al., 2009). Nonetheless, it is notable to mention that in families of young children with T1DM, several studies have reported mealtime behaviors to be challenging likely due to the importance of matching insulin to carbohydrate intake (Patton, Williams, Dolan, Chen, & Powers, 2009; Powers et al., 2002; Wysocki, Huxtable, Linscheid, & Wayne, 1989). There are no studies which have examined parental perceptions of mealtime behavior problems and pediatric parenting stress, but past research has found problems with mealtime behaviors are correlated to parents' reporting of general parenting stress (Powers et al., 2002). Thus, it is possible child mealtime problems may also be associated with pediatric parenting stress, making it an important correlate to consider in a model examining parenting stress in young children with T1DM.

To summarize, parents of young children with T1DM are expected to experience pediatric parenting stress because of their central role in managing their child's diabetes. Past research has individually correlated pediatric parenting stress with measures of parental fear of hypoglycemia, depressive symptoms, and child behavior problems, but a model of pediatric parenting stress containing these correlates has not yet been examined. There are cognitive-behavioral treatments available to help parents of young children cope with parenting stress, address child behavior problems, and manage their feelings of depression and fear of

hypoglycemia. Examining pediatric parenting stress in a model containing all of these correlates may help with intervention development and in prioritizing specific treatments.

Subsequently, the objective of this study was to examine pediatric parenting stress and psychological correlates of parenting stress in a sample of parents of young children with T1DM. Based on the literature, we hypothesized that among parents of young children with T1DM, greater perceived mealtime problems, parental depressive symptoms, and parental fear of hypoglycemia would be related to higher pediatric parenting stress.

Methods

Participants

This manuscript reports on a subset of questionnaire data collected as part of a larger study which recruited young children to complete at least 3 days of continuous glucose monitoring. The sample consisted of 39 young children and a parent from two Pediatric Diabetes Centers in the midwestern United States. Inclusion criteria were: child less than 7 years old, T1DM diagnosis for at least 1 year, intensive insulin treatment (e.g., insulin pump or multiple daily injections) and English spoken in the home. Seventyseven families received a letter informing them that they might be eligible to participate in the study. Thirty-eight families refused to participate either due to time constraints, the requirement of continuous glucose monitoring, or because they were not interested. Thus, the overall recruitment rate was 51%.

Procedure

Before recruiting families, approval was obtained from the Institutional Review Board at each participating institution. Families who were presumed eligible to participate were first identified by a database review. Families were contacted via letter about the study with a follow up telephone call about 2 weeks later to answer questions and formally recruit families for the study. Parents who agreed to participate completed the written informed consent and study questionnaires at home. In all cases, the parents who completed the questionnaires were identified as having a primary role in their child's daily diabetes self-care. As a surrogate marker of children's average glycemic control, glycosylated hemoglobin A1c (HbA1c) levels were gathered via medical chart review. Only values measured within 3 months of study participation were collected. The mean HbA1c for children participating in this study was $8.6 \pm 1.3\%$, which was slightly higher than the American Diabetes Association recommended age-based target for young children with T1DM, which is $\leq 8.5\%$ (Silverstein et al., 2005).

Dependent Measures

Behavioral Pediatric Feeding Assessment Scale (BPFAS)—The BPFAS is a 35-item parent report questionnaire designed to measure problematic child and parent mealtime behavior (Crist & Napier-Phillips, 2001) and validated for use in families of young children with T1DM (Patton, Dolan, & Powers, 2006b). Examples of items from the BPFAS include: “my child readily comes to the table at mealtimes,” “my child eats vegetables,” “my child gets up from the table during meals,” and “I use threats to get my child to eat” (Crist & Napier-Phillips, 2001). Responses to the BPFAS are generated using a 5 point Likert scale (“1 = never” to “5 = always”) which corresponds to the frequency of mealtime problems. Higher scores on the BPFAS reflect a perception of more frequent problems. The BPFAS generates two frequency scores: (1) Child Behavior-Frequency and (2) Parent Behavior-Frequency. For this study, the Child Behavior-Frequency score was used, as this score reflects parents' perception of how frequent their child is disruptive at meals.

Pediatric Inventory for Parents (PIP)—The PIP is a 42-item parent report questionnaire designed to measure parenting stress related to caring for a child with a chronic illness (Streisand et al., 2001). Two scores are generated for the PIP. One score reflects the frequency of stressful events (PIP-F). The other score reflects the intensity or difficulty perceived by parents (PIP-D). Higher scores on the PIP reflect a perception of greater frequency or intensity of parenting stress.

Hypoglycemia Fear Survey-Parents of Young Children (HFS-PYC)—The HFS-PYC is a 26-item parent-report questionnaire which measures parents' fear of hypoglycemia (Patton et al., 2008). The HFS-PYC is adapted from the HFS (Cox, Irvine, Gonder-Frederick, Nowacek, & Butterfield, 1987) a valid measure originally designed for use in adult patients with T1DM. The HFS-PYC is scored to yield two subscale scores and a total score. The Worry subscale reflects parents' worry about the occurrence of hypoglycemia. The Behavior subscale reflects behaviors parents may engage in to avoid a hypoglycemic event. The Total score provides a measure of both parents' worry and behavior related to hypoglycemia. The HFS-PYC is scored so higher values reflect greater fear. To reduce the number of variables, only the HFS-PYC Total score was used for the study analyses.

Beck Depression Inventory-Second Edition (BDI-II)—The BDI-II is a 21-item questionnaire designed to assess for depressive symptoms (Beck, Steer, & Brown, 1996). The BDI-II is scored such that higher scores suggest more severe depressive symptoms. Consistent with ethical research guidelines maintained by the participating institutions, parents with at least moderate symptoms were offered contact information to access counseling services if desired.

Data Analyses

To examine sample characteristics, means, standard deviations, and frequencies were calculated for variables. Pearson correlations were used to examine the bivariate relations between parents' scores on the PIP, demographic data, and their scores on the BPFAS, HFS-PYC, and BDI-II. To control for the multiple associations generated by these analyses, we used an a priori alpha level of $p = .01$. Two hierarchical linear regression analyses were used to predict sources of parenting stress. For these analyses, parents' PIP difficulty and frequency scores each served as the dependent variable, respectively. Independent variables included parent's BPFAS, HFS-PYC, and BDI-II scores.

Results

Sample Characteristics

Young children had a mean age of 5.1 ± 1.1 years and participating parents' had a mean age of 35 ± 6.4 years. There were 20 boys and 19 girls in the child sample. In the parent sample, 32 mothers, six fathers, and one custodial grandparent participated. Eighty-two percent of parents identified their child as White and 62% of young children used an insulin pump for diabetes management. Seventy-four percent of parents reported they were married and 54% reported a family income greater than \$50,000 per year. Table 1 summarizes parents' scores on the dependent and independent variables. For the BDI-II, 13% of parents responded with a total score in the mild to moderate range of depressive symptoms. Parents' HFS-PYC, BPFAS, and PIP-D scores were comparable to published values for other samples of parents of young children with T1DM (Mitchell et al., 2009; Patton et al., 2007, 2008).

Bivariate Correlations

Correlations between the dependent variable with demographic and independent variables are presented in Table 1. There were no significant correlations found between the

demographic variables and parents' reporting on the dependent and independent variables. More frequent parenting stress (PIP-F) was associated with greater HFS-PYC Total scores and higher BDI-II scores for parents of young children with T1DM. Similarly, more difficulty with pediatric parenting stress (PIP-D) was associated with higher HFS-PYC Total scores and higher BDI-II scores. There was a statistical trend towards a positive correlation between parenting stress frequency and parents' perceptions of child mealtime problems (BPFAS Child Behavior-Frequency) suggesting higher frequency of parenting stress was associated with a higher frequency of mealtime problems. However, no correlation was detected between stress difficulty and parents' perceptions of child mealtime problems.

Linear Regressions

Given the weak associations found between the pediatric parenting stress scores and parents' BPFAS scores for mealtime behaviors, this independent variable was not included in the linear regression equations a priori. Results for the pediatric parenting stress frequency regression indicated that parents' depressive symptoms were significantly associated, but fear of hypoglycemia was not (adjusted $R^2 = .58$, $F(2, 33) = 25.4$, $p = .000$). The adjusted model was found to account for 58% of the variance in parents' stress frequency. For the pediatric parenting stress difficulty regression, the model revealed that parents' depressive symptoms and fear of hypoglycemia were both significantly associated (adjusted $R^2 = .68$, $F(2, 30) = 35.1$, $p = .000$). For this model parents' depressive symptoms and parents' fear of hypoglycemia were found to account for 68% of the variance in parents' stress difficulty (Table 2).

Discussion

The purpose of this study was to examine three psychological correlates of parenting stress in a sample of parents of young children with T1DM. The results found that nearly half of pediatric parenting stress frequency was predicted by parental depressive symptoms. With respect to pediatric parenting stress difficulty, 68% of the variance was associated with parental depressive symptoms and fear of hypoglycemia. The results of this study suggest that parents of young children with T1DM may benefit from interventions to target pediatric parenting stress and problems of psychological distress, such as depression and fear of hypoglycemia.

The results of this study are consistent with extant literature. Similar to parents of older children with T1DM, our results found that parents who report greater fear of hypoglycemia also report greater levels of pediatric parenting stress (Streisand et al., 2005). We also found a strong positive association between pediatric parenting stress and parental depressive symptoms, a relationship which had previously been observed in parents of newly diagnosed children (Streisand et al., 2008). Interestingly, there was only a weak association found between pediatric parenting stress frequency and parents' perceptions of mealtime behavior problems. As noted in past research, parental perceptions of mealtime behavior problems have been associated with greater reporting of general parenting stress frequency in families of young children with T1DM (Powers et al., 2002). However, this previous study recruited a sample of young children who was exclusively on injection therapy. Thus, it is possible that in a sample of young children primarily on pump therapy, parents' pediatric parenting stress frequency levels may be impacted by other diabetes regimen variables more than mealtime behavior. Also, unexpectedly there was no relation found between mealtime problems and parents' pediatric stress difficulty. The extant literature suggests that mealtimes can be perceived as problematic by many parents of young children with T1DM (Patton et al., 2009; Powers et al., 2002; Wysocki et al., 1989) and for families of young children on an insulin pump, mealtime problems correlate with higher average glucose levels, suggesting mealtime problems may still impact outcomes for young children (Patton

et al., 2009). It is possible that the lack of association found for these variables may be related to the mealtime questionnaire used for this study. The BPFAS is a general measure of mealtime behaviors and while it has been used extensively in research in families of young children with T1DM (Patton et al., 2006b, 2009; Powers et al., 2002), it is possible that it may miss some mealtime problems that could be specific to T1DM, such as the timing or amount of food intake or problems specific to carbohydrate counting. Therefore, as part of examining the role child behavior may play in pediatric parenting stress in families of young children with T1DM, future research should consider adding questions to the BPFAS that are specifically tailored to diabetes management.

The data collected for this study are cross-sectional. Therefore, we cannot determine causality among the variables. It is possible that symptoms of depression and fear of hypoglycemia may prime parents to perceive greater levels of pediatric parenting stress related to caring for their child's diabetes. Or, it is possible that higher levels of pediatric parenting stress may reduce parents' coping resources leaving them more vulnerable to symptoms of depression and fear of hypoglycemia. Future longitudinal research would be needed to determine how these variables impact each other. Regardless of the direction of causality, all of these variables are modifiable via cognitive-behavior therapy and/or education.

The results of this study suggest parents of young children with T1DM may benefit from an assessment of pediatric parenting stress, depressive symptoms, and fear of hypoglycemia. If parenting stress levels are found to be high, parents may benefit from intervention strategies including stress management training and cognitive reframing, which may help parents to better manage their feelings related to caring for their child's diabetes. For parents experiencing high levels of fear of hypoglycemia, diabetes education specific to the management of hypoglycemia may be helpful as well as teaching parents coping strategies to help them manage feelings of uncertainty related to their child's blood glucose levels. Finally, parents reporting high levels of depressive symptoms would benefit from cognitive-behavior therapy to address their symptoms. Given the relations found among these variables, it is possible that intervening in only one of these distress variables may help to improve functioning in the other variables. In addition, while the current model did not include parental perceptions of social support, the larger behavioral medicine literature suggests that greater perceived social support can impact depressive symptoms and coping appraisal (Mistry, Stevens, Sareen, De Vogli, & Halfon, 2007). Thus, future research is needed to explore the role of parental perceived social support in pediatric parenting stress in families of young children with T1DM, as helping parents to access different forms of social support may offer another valuable intervention method.

There are limitations to report for the current study. First, this study recruited a small and fairly homogenous sample of parents of young children with T1DM, the majority of whom described themselves as married, White and from the middle to upper-middle socioeconomic class. While these families were generally representative of the center populations from which they were recruited, it is possible these demographic variables could have affected parents' perceptions of stress or their reporting of depressive symptoms. Thus, the reader is cautioned that the results of this study may not generalize to all parents of young children with T1DM, and particularly to single parents or families from a lower socioeconomic class, who may have more limited resources and be more vulnerable to feelings of parenting stress. Second, this study recruited a sample of young children with a high rate of insulin pump use versus injections. It is known that pump therapy can offer patients greater flexibility in the timing and dosing of insulin, which in turn might help to relieve some of the stress related to diabetes management. Thus, as stress was the primary outcome measure, it is possible that the results of this study might have been different if

young children on insulin injections had been in the majority. Future research will need to examine differences in pediatric parenting stress in families of young children with T1DM based on insulin regimen. In the meantime, the results of this study may not generalize to other samples of young children with lower rates of insulin pump use. Third, we recruited primarily mothers to complete the questionnaires. Thus, the results of this study may not generalize to fathers, who may experience pediatric parenting stress and its psychological correlates differently. Finally, the questionnaires used for this study were self-report. Thus, it is possible that some of the associations reported in this study may be a result of shared method variance. In future research, use of a structured interview may allow for more objective data which could minimize these effects.

In conclusion, this study specifically reports on pediatric parenting stress in parents of young children with T1DM and relates parenting stress to parents' perceptions of mealtime behavior problems, depression, and fear of hypoglycemia. The study findings highlight the importance of assessing for these variables in parents of young children with T1DM and providing interventions to help parents reduce their perceptions of stress, fear, and depressive symptoms.

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Fig. 1.
Study-specific theoretical model of pediatric parenting stress

Table 1

Summary of outcome variables and bivariate correlations with pediatric parenting stress

	<i>M</i> ± <i>SD</i>	%	<i>r</i> _{PIP-Freq}	<i>r</i> _{PIP-Diff}
Child age (years)	5.1 ± 1.1		.00	.04
Child gender (male)		51	−0.11	−.021
Ethnicity (Caucasian) [†]		82		
Insulin regimen (pump)		62	.00	.03
HbA1c (mg/dl)	8.6 ± 1.3		.22	.10
Parent age (years)	35.1 ± 6.4		−.30	−.27
Parent marital status (married) [†]		29		
Family income >\$50,000 [†]		54		
BPFAS-Child Frequency	46.5 ± 7.3		.29	.29
HFS-PYC Total	78.6 ± 18.4		.58*	.68*
BDI-II	9.1 ± 10.1		.77*	.77*
PIP-Freq	107.3 ± 32.6			.91*
PIP-Diff	92.7 ± 33.0			

Note: for child gender: 0, female; 1, male. For insulin regimen: 0, shots; 1, pump

BPFAS Behavioral Pediatric Feeding Assessment Scale-Child Frequency subscale; HFS-PYC Total Hypoglycemia Fear Survey-Parents of Young Children; BDI-II Beck Depression Inventory-II; PIP-Freq Pediatric Inventory for Parents-Frequency; PIP-Diff Pediatric Inventory for Parents, Difficulty

[†] Variables contained more than 2 levels. ANOVA results found no significant difference in parenting stress by level of each variable

* *p* = .01

Table 2

Regression models of pediatric parenting stress in parents of young children with type 1 diabetes

Variable entered	<i>B</i>	SEB	β
<i>Stress frequency</i>			
BDI-II	2.10	.44	.64*
HFS-PYC	.36	.24	.20
<i>Stress difficulty</i>			
BDI-II	1.98	.41	.56*
HFS-PYC	.75	.21	.41*

HFS-PYC Hypoglycemia Fear Survey-Parents of Young Children; *BDI-II* Beck Depression Inventory-II; *PIP-Freq* Pediatric Inventory for Parents-Frequency; *PIP-Diff* Pediatric Inventory for Parents, Difficulty

* $p = .01$