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Parent-child relationships in type 1 diabetes: Associations among child behavior, parenting behavior, and pediatric parenting stress

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Abstract

Purpose—Interactions between parents and children can influence behavioral and emotional functioning related to type 1 diabetes (T1D), yet have been relatively unexplored during preadolescence. The present study examined associations among child problem behaviors, critical parenting behaviors, and pediatric parenting stress in a sample of preadolescent youth with T1D.

Methods—Data are available from 86 preadolescent-parent dyads who participated in the initial baseline assessment of an RCT designed to assess the efficacy of an adherence promotion program. Measures included the Eyberg Child Behavior Inventory, the Diabetes Family Behavior Checklist, and the Pediatric Inventory for Parents.

Results—After controlling for significant demographic and medical characteristics, parents who reported their child's behavior as more problematic reported more difficulty with pediatric parenting stress, which was also associated with more child-reported critical parenting behaviors.

Conclusions—Child problem behaviors and critical parenting behaviors were associated with one another, partially via their association with increased pediatric parenting stress. Potential clinical applications include interventions geared towards helping parents manage difficult child behaviors as well as cope with pediatric parenting stress, with the ultimate goal of improving the parent child relationship and management of T1D.

Keywords

child behavior; critical parenting; parenting stress; type 1 diabetes; preadolescence

Type 1 diabetes (T1D), one of today's most common chronic illnesses (CDC, 2011), is increasing in prevalence among youth. In 2007 researchers estimated a prevalence rate of 24.3% (SEARCH, 2007), and estimated up to a 144% increase in prevalence by the year 2050 (SEARCH, 2012). Daily life with T1D requires adherence to a complex care regimen that involves frequent blood glucose monitoring, insulin administration, and careful monitoring of diet and physical activity (CDC, 2011). Effective T1D management requires coordination and cooperation from both parents and children (e.g. Palmer et al., 2011). Both short- and long-term health consequences of poor disease management and glycemic control can be severe and impact quality of life (Silverstein et al., 2005). Yet high rates of non-adherence are common during adolescence (Johnson et al., 1992) as youth become more

independent and assume increased responsibility for T1D care. Thus, preadolescence may be a valuable developmental period for researchers to explore.

Preadolescence is traditionally defined as a transitional phase between childhood and adolescence spanning from ages 9-14 depending on pubertal onset (Frank & Cohen, 1979). It is characterized by a shift away from relationships with parents as youth develop greater autonomy (Cincotta, 2008). Examining both parent and child psychosocial contributions to disease management during this period can illuminate factors that may later influence older youth with T1D. Factors that contribute negatively to T1D management can then be addressed earlier to potentially mitigate deterioration in adherence and glycemic control.

Transactional Relationships in T1D

Bronfenbrenner's (1977) social-ecological model posits that both intrapersonal (i.e., child temperament) and interpersonal (i.e., caregiver support) factors contribute to behavioral and emotional states in youth and provides a foundation for understanding the parent-child relationship with regard to T1D management. More recent research defines relationships between caregivers and youth as transactional (Sameroff et al., 2009), meaning that youth and caregiver characteristics and behaviors mutually influence and shape one another. This transactional relationship between parent and child is important for both parent and child functioning (Sameroff & Mackenzie, 2003).

Researchers have also examined the relationship between youth with chronic illness and their caregivers (e.g., Thomspon & Gustafson, 1996), and have established findings supporting the importance of the transactional parent-child relationship among youth with T1D (Chaney et al., 1997; Hocking & Lochman, 2005). For instance, the parent-child relationship influences both regimen adherence and glycemic control (Lewin et al., 2006). Regimen adherence is bolstered by caregiver involvement (e.g., Anderson et al., 2002; Anderson et al., 1999; Anderson et al., 1997; La Greca et al., 1995), authoritative parenting (Monaghan et al., 2012), and parental monitoring of diabetes-related tasks (Ellis et al., 2007). In turn, child factors can influence family functioning and are also associated with glycemic control. Hood and colleagues (2006) found that depressive symptoms are associated with diabetes-specific family conflict (e.g. arguing about T1D management tasks). Mackey and colleagues (2011) found that positive youth qualities (e.g., intrapersonal resilience factors, positive family interactions that support T1D management) were associated with family cohesion, T1D management, and glycemic control. Perhaps most notably, Duke and colleagues (2008) identified a "mutually reinforcing behavior pattern" in which a child with diabetes' externalizing behavior problems may lead to negative parenting responses, which subsequently increase children's reluctance to comply with caregiver demands and thus decrease adherence. Environmental factors can also influence the parent-child relationship. Specifically, pediatric parenting stress, parenting stress relating to a child's illness, is also related to both parent and child behaviors that can impact adherence and glycemic control (e.g., Hilliard et al., 2011; Monaghan et al., 2012; Streisand et al., 2005).

Preadolescence

As children progress into adolescence and become increasingly independent, they begin renegotiating boundaries and relationships, and in particular begin to rely less on parents (Cincotta, 2008). T1D adds additional complexity to this preadolescent period as the transition to greater independence coincides with the unique demands of T1D management. Specifically during preadolescence, division of diabetes care responsibilities begins to shift from parent to child (Anderson et al., 1990; La Greca, Follansbee, & Syler, 1990), as youth take on greater responsibility for disease management. This age may also mark the

beginning of a decline in adherence behaviors and glycemic control often seen during adolescence (Anderson et al., 1997; Johnson et al., 1992).

The quality of the parent-child relationship during preadolescence may be vital to disease management, as better quality relationships are associated with more favorable outcomes during adolescence (Berg et al., 2011; Palmer et al., 2011). Specifically, “critical” parenting (e.g., criticism, nagging, and negativity) may decrease the quality of the relationship between parents and children. Critical parenting contributes to suboptimal adherence and poor glycemic control for children of all ages (Duke et al., 2008; Lewin et al., 2006), as well as depressive symptoms, and diminished self-efficacy and self-care behaviors among preadolescents (Armstrong et al., 2011).

A paucity of research regarding parenting stress and its influence on the transactional relationship between parents and preadolescents exists. In families of young children with T1D, parents’ perception of child behavior as problematic contributes to increased parenting stress (Hilliard et al., 2011). Among preadolescents, greater authoritative parenting has been associated with greater behavioral adherence and decreased difficulty with pediatric parenting stress (Monaghan et al., 2012). However, the dynamic relationship between parent behavior, child behavior, and parenting stress has not yet been explored in T1D during preadolescence.

Current Study

The unique demands that T1D places on parents and children are affected by the changing parent-child relationship during preadolescence. Further, a host of parent, child, and environmental factors can influence this relationship. Transactional parent-child relationships in youth with T1D, especially at key developmental time points like preadolescence, need to be better understood in order to inform efforts at improving diabetes management and preventing declines in adherence and glycemic control during adolescence. In order to elucidate the influence of child behavior on parenting behavior, the present study examined associations among child behavior, parenting behavior, and pediatric parenting stress. Associations among these factors and T1D management were also explored.

Researchers proposed a relationship between child problem behaviors and critical parenting behaviors, mediated by parenting stress, in a cross-sectional sample of preadolescent youth with T1D. It was hypothesized that increased child problem behaviors would be associated with more critical parenting behaviors, mediated by their association with increased parenting stress. Examining these variables cross-sectionally can provide a valuable snapshot of transactional relationships during preadolescence, as well as a platform from which to further probe relationships among specific variables longitudinally.

Given that previous research has demonstrated associations between parent-child relationship factors and T1D management, it was also hypothesized that parent-child relationship variables of interest (e.g., child behavior, parenting behavior, pediatric parenting stress) would also be associated with measures of T1D management (e.g., adherence and glycemic control). In general, studies have yielded mixed results regarding psychosocial variables and T1D medical outcomes across childhood. For instance, a widely used measure of glycemic control is hemoglobin A1c (HbA1c), which reflects average blood glucose levels over 2- to 3-months (American Diabetes Association, 2010). Although one study of parents of young children (< 9 years old) demonstrated that, counter to expectations, higher levels of caregiver stress is associated with lower HbA1c (Stallwood 2005), another conducted with youth ages 8-18 ($M= 13.7$, $SD= 2.5$) demonstrated worse glycemic control for children who reported more negative and critical parent-child relationships (Lewin et al.,

2006). Analysis of associations among psychosocial and behavioral factors as well as medical outcomes can help inform clinical interventions by targeting specific attitudes and behaviors related to parenting stress and parent-child relationship quality, which may also be associated with adherence and/or glycemic control.

Methods

Participants and Procedure

Data were obtained from 86 preadolescents with T1D and their primary caregivers who attended a regularly scheduled outpatient endocrinology appointment at a large, mid-Atlantic children's hospital or one of its satellite clinics. All data were obtained at the baseline assessment of a randomized controlled trial (RCT) designed to assess the efficacy of an adherence promotion program for parents and preadolescents. After completing baseline assessment, participants were randomized to either an adherence promotion or standard diabetes education group. In addition to standard diabetes education, the adherence promotion group met with a trained research team member at their next two clinic visits and then participated in a group session with other parents and preadolescents for the final visit. Results from both groups were compared to one another and to a usual care condition.

Eligibility requirements included 1) the ability to speak and write in English, 2) being free of developmental disabilities, psychotic disorders, or other serious medical conditions, and 3) for females, not having reached menarche. Study approval was obtained from the Institutional Review Board. Recruitment letters were sent to all parents of preadolescents aged 9-11 years at participating outpatient clinics. Families were then contacted by phone to ensure fulfillment of enrollment criteria and determine desire to participate. Of the 260 informational letters sent, 209 families were successfully contacted, and 155 met all eligibility criteria. One hundred eight of these eligible families provided verbal consent (70%). Of these families, 86 (79.6%) completed baseline data prior to participation in the RCT. Study consent and preadolescent assent were obtained and baseline questionnaires were distributed. The majority of questionnaires were completed by mail, with approximately 5% conducted by a trained research assistant at the child's diabetes clinic visit or over the telephone.

Demographic and Medical Characteristics

See Table 1. The sample was 53.5% female, ages 9-11 years ($M = 10.8$ years), and 93% of primary caregivers were mothers. The majority of the sample was Caucasian (73%), although represented an array of ethnicities. The majority of primary caregivers were married (74.1%), and 67.2% had completed at least some college. 77.5% of the sample reported an annual household income above \$50,000. Fifty-six percent of the children were prescribed a conventional insulin regimen and received scheduled insulin injections (2 or 3 shots/day of mixed NPH/regular or analog insulin). Conventional regimens are by nature, fairly straightforward and often prescribed for those who might have difficulty managing a more complex basal/bolus system which requires carbohydrate counting and flexibility. The remaining 44% were prescribed a more flexible basal/bolus regimen (insulin pump or multiple daily injections). Mean illness duration was 4.2 years. Youth had an average HbA1c of 8.14% ($SD = 1.28$; $Range = 5.4-11.9$), which slightly exceeds the recommended < 8% for school-aged children (American Diabetes Association, 2013). On average, youth performed 4.55 blood glucose checks per day ($SD = 1.59$; $Range = 2-9$), which aligns with some recommendations for monitoring (At least 4 checks per day; Chase & Fiallo-Scharer, 2006). Recommendations for blood glucose monitoring vary for each individual, depend on a variety of factors (e.g., regimen type, diet, ability to responsibly manage T1D) and can fluctuate with a variety of circumstances (e.g., number of checks should be increased when

individuals with T1D are sick, exercise, feel “low”, or have ketones in urine due to high blood sugar levels). Accordingly, recommendations for number of checks per day also vary. One popular T1D reference book used by clinicians and families recommends at least 4 checks/day (Chase & Fiallo-Scharer, 2006), and current recommendations from the American Diabetes Association suggest checking blood sugar at least 6-8 times daily for those on a basal/bolus regimen (American Diabetes Association, 2013).

Measures

Demographic and Medical Data—Primary caregivers completed a demographic information questionnaire developed by the research team, which included information about annual household income and ethnicity. Child age, illness duration, and insulin regimen were obtained from medical record reviews. Glycemic control was assessed via HbA1c analysis through blood assay (DCA 2000, Bayer, Inc. Tarrytown, NY), recorded during the clinic visit, and then abstracted from medical records as well. Parents and preadolescents also completed a 24-hour diabetes recall interview as a proxy-measure of adherence behaviors. (DIs; Holmes et al., 2006, adapted from Johnson, Silverstein, Rosenbloom, Carter, & Cunningham, 1986). The DI asks respondents to describe the completion of diabetes management behaviors, including BG monitoring and insulin administration. Participants completed the DI during the initial in-clinic assessment and again over the telephone within two weeks of completing questionnaires. Average number of BG checks per day across both interviews was calculated. The 24-hour recall is a valid, reliable, and well-established measure of diabetes adherence behaviors (Freund, Johnson, Silverstein, & Thomas, 1991; Quittner, Modi, Lemanek, Ievers-Landis, & Rapoff, 2008).

Child Behaviors—The Eyberg Child Behavior Inventory (ECBI; Robinson, Eyberg, & Ross, 1980) was used as a parent-report of problematic child behaviors. The measure asks parents to rate the frequency of 36 child behaviors on a 7-point Likert scale, that ranges from “Never” to “Always,” and to subsequently indicate whether they consider each behavior to be a problem (yes/no). ECBI has demonstrated adequate reliability and validity (Robinson et al., 1980). The present study utilized the ECBI problem scale because of its focus on caregivers’ perceptions of the difficulty associated with specific child behaviors. Internal consistency was excellent ($\alpha = 0.95$).

Parenting Behaviors—The Diabetes Family Behavior Checklist (DFBC; Schafer et al., 1986), a measure of perceived family support of diabetes-related behaviors, was used via child report to assess critical parenting behaviors. Children rated their primary caregiver on items such as “How often does your parent criticize you for not recognizing the results of a blood sugar check?” and “How often does your parent nag you about following your nutrition plan?” The measure is rated on a 5-point Likert scale from “Never” to “At least once a day.” The present study utilized the 7-item Negative Parenting subscale. Previous studies have found the internal consistency for the Negative Parenting subscale to range from .60 to .82 (Lewin et al., 2005). Internal consistency in the present study was fair and consistent with previous literature ($\alpha = 0.66$).

Parenting Stress—The Pediatric Inventory for Parents (PIP; Streisand, Braniecki, Tercyak, & Kazak, 2001) was used to measure parents’ difficulty dealing with perceived life stressors related to their child’s T1D. The PIP asks caregivers to rate the frequency and perceived difficulty of 42 events commonly described by parents of children with a chronic illness. Responses are scored based on two separate 5-point Likert scales, a frequency scale ranging from “Never” to “Very often” and a difficulty scale ranging from “Not at all” to “Extremely.” The PIP has demonstrated strong internal consistency and construct validity among parents of children with diabetes (Lewin et al., 2005; Streisand et al., 2005) and has

been deemed a “well-established” assessment of family impact of childhood chronic illness (Alderfer et al., 2008). The PIP difficulty scale was used in the present study given its emphasis on the degree to which various events are perceived as stressful. Internal consistency was excellent ($\alpha = 0.95$).

Results

Data Analytic Plan

Descriptive analyses and bivariate correlations were first computed to explore relationships among DFBC, ECBI, and PIP scores, as well as demographic variables. Demographic variables significantly associated with the predictor, mediating, or outcome variables were included as control variables in subsequent regression models. Next, hierarchical linear regressions were conducted in PASW (SPSS, Version 19.0) to examine the relationships between critical parenting, child problem behaviors, and parenting stress. Specifically, a mediation model hypothesizing that child behavior problems were associated with critical parenting behavior via their association with parenting stress was assessed using Baron and Kenny’s (1986) criteria, which specifies that: (1) there must be a significant association between the predictor and the outcome, (2) the predictor must be significantly associated with the mediator, (3) that there should be a significant association between the mediator and the outcome, (4) and finally that the addition of the mediator to the regression model should decrease the significance of the relationship between the predictor and the outcome, utilizing Sobel’s test. The effect sizes of the standardized path loadings were assessed according to Cohen (1988): 0.1 = small, 0.3 = medium, 0.5 = large. Relationships of variables of interest with medical outcomes (adherence as measured by BG checks and HbA1c) were also explored. Bivariate correlations were conducted, and subsequent hierarchical linear regression was performed to further examine the relationships between significant correlations.

Sample Characteristics

Means and standard deviations of variables of interest were examined (see Table 1). Approximately 15% of the current sample (16 participants) reported ECBI scores above the clinical cut-off, which is consistent with other reports from similarly aged youth with chronic illness (Colvin, Eyberg, & Adams, 1999). Participants also reported a rate of critical parenting behaviors consistent with previous research (Schafer et al., 1986). Parents in the current sample of preadolescents (M age= 10.8 years) reported less pediatric parenting stress overall than parents of slightly older children (M age= 12.9 years; Streisand et al., 2005).

Associations Among Outcome Variables

See Table 2. Bivariate correlations were conducted among measures of interest and demographic variables. Of note, child’s gender was significantly correlated with ECBI scores, with boys exhibiting more problematic behavior than girls. Regimen type was significantly correlated with critical parenting behaviors; a conventional regimen was associated with more critical parenting compared to basal bolus regimen. Ethnicity was significantly associated with both annual household income and regimen type, such that higher annual household income as well as basal/bolus regimen were associated with Caucasian ethnicity. Average annual household income was significantly negatively correlated with all measures of interest. Specifically, lower annual household income was associated with more critical parenting, more problematic child behavior, and greater pediatric parenting stress. Given these correlations, gender, regimen, ethnicity, and annual household income were included as the first step in analyses.

Furthermore, problematic child behaviors were significantly correlated with critical parenting behaviors, as well as with parenting stress, and parenting stress was associated with critical parenting behaviors. Therefore, a mediation model hypothesizing that problematic child behaviors are associated with critical parenting via their association with parenting stress was examined.

Parenting Stress as a Mediator

See Figure 1. Using the criteria for a mediation effect set forth by Baron and Kenny (1986), child problem behaviors were significantly associated with critical parenting $F(5,66) = 3.25$, $p = .01$, and parenting stress $F(5,71) = 11.33$, $p < .001$. With all variables in the model, including child gender, regimen type, ethnicity, and income in the first step as covariates, parenting stress was significantly associated with critical parenting $F(6,64) = 3.54$, $p = .004$, and the effect of child problem behaviors on critical parenting was significantly decreased when parenting stress was included in the final model $F(3,83) = 6.74$, $p < .001$, Cohen's $f^2 = .33$, indicating a moderate effect size and a partial mediation (Sobel's equation $z = 1.88$, $p = .06$). Fifty-five percent of the association between child problem behaviors and critical parenting behaviors was accounted for by pediatric parenting stress.

Associations with Medical Outcomes

Additionally, relationships between variables of interest and medical outcomes were explored. Critical parenting behaviors were significantly correlated with HbA1c ($r = .27$, $p = .02$), indicating that higher HbA1c (i.e., less optimal glycemic control) is correlated with more child-reported critical parenting. Hierarchical linear regression was performed to further examine this correlation, controlling for gender, regimen, ethnicity, and income, but no significant association was found between critical parenting and HbA1c, $F(5,65) = 1.91$, $p = .10$. HbA1c was not significantly correlated with either problematic child behaviors or pediatric parenting stress, and similarly, average number of daily blood glucose checks was not correlated with the variables of interest. Given that the prescribed number of BG checks varies across individuals, prescribed insulin injections were explored post-hoc and compared to average injections across 2 days of DI ($M = .08$, $SD = .38$) as another potential adherence outcome. Likewise, this did not correlate significantly with any of our variables of interest. Taken together, these two findings indicate that, even though measures of self-care are imperfect, they do not correlate with the variables of interest in the present sample.

Discussion

As hypothesized, problematic child behaviors appear to be associated with critical parenting behaviors, and this relationship is partially explained via an association with increased pediatric parenting stress. Specifically, children who exhibit more difficult behavior are more likely to report having parents who criticize or nag them, and these parents also report higher levels of stress related to their child's T1D. Elevated pediatric parenting stress appears to mediate the relationship between problematic child behaviors and critical parenting behaviors. Given that parent-child relationships appear crucial to diabetes management during childhood (Anderson et al., 2009; Wiebe et al., 2005), addressing factors that contribute to such relationships during preadolescence may foster more positive interactions as youth become more independent in their diabetes care during adolescence. Contrary to the secondary hypothesis, although critical parenting and HbA1c were correlated, upon further analysis T1D management was not significantly associated with parent-child relationship variables of interest.

Contributions to Current Literature

Child problem behaviors are related to general parenting behaviors in healthy populations (e.g., Periera et al., 2009) as well as among youth with T1D (e.g., Duke et al., 2008). This study provides specific evidence that among preadolescents with T1D, problematic externalizing behaviors are associated with negative, critical parenting behaviors that may influence disease management. Although research demonstrates that pediatric parenting stress is related to problematic child behaviors in young children with T1D (e.g., Hilliard et al., 2011), this study is one of the first to elucidate the relationship among preadolescents. Additionally, although it is known that pediatric parenting stress is related to parenting style among preadolescents with T1D (e.g. Monaghan et al., 2012), this study sheds additional light on how pediatric parenting stress can influence parenting behaviors, because parenting stress exacerbates potential strain on the relationship between problematic child behaviors and critical parenting. Results demonstrate that pediatric parenting stress influences the parent-child relationship and are consistent with a transactional model of behavior among youth with T1D and their caregivers. Given that previous research demonstrates that the quality of the parent-child relationship is crucial for effective T1D management, pediatric parenting stress may negatively influence relationship quality.

Results also support associations between dependent variables and several key demographic and medical variables (gender, regimen, and annual household income). Of note, boys exhibited more problematic behavior than girls, which is consistent with previous research (Robinson, Eyberg, & Ross, 1980). Additionally, a conventional insulin regimen was associated with more critical parenting behaviors. Given that conventional regimens are often prescribed to those who either demonstrate or may experience difficulty managing the more complex basal/bolus system, critical parenting may be associated with preadolescents' inability to manage a more flexible regimen, or it may be that preadolescents who require a conventional regimen are more difficult to parent. The cross-sectional nature of the present study does not provide insight into the directionality of this association, which should be addressed in future research. Finally, lower annual household income was associated with more problematic parent and child behaviors as well as greater parenting stress. The compounding effect of household income and insulin regimen is consistent with the current literature (e.g., Paris et al., 2009) and likely contributes to problematic behaviors as well as parenting stress.

Though critical parenting behaviors were significantly correlated with HbA1c, no significant association was found between critical parenting and HbA1c when controlling for demographic variables. Nor was HbA1c was significantly correlated with problematic child behaviors or pediatric parenting stress. Average number of daily blood glucose checks was also not associated. As children enter the teenage years parental involvement decreases (La Greca, Follansbee, & Syler, 1990), as does glycemic control (Johnson et al., 1992). However, parents are often more involved in T1D care during preadolescence than later adolescence (Anderson et al., 1997), which could effectively maintain good glycemic control and account for the lack of association among medical outcomes and psychosocial variables despite worrisome behaviors and elevated stress. Thus, it makes sense that this decrease in glycemic control may not yet be occurring as early as preadolescence. Although not always directly related to medical outcomes, psychosocial variables such as child behavior, parenting behavior, and parenting stress still warrant examination in the context of chronic illness, given the wealth of evidence demonstrating their relationship with emotional and behavioral outcomes. Addressing issues in the parent-child relationship during preadolescence may serve to provide a smoother transition to independence in T1D management and better glycemic control during adolescence and beyond.

Clinical Implications

Examining transactional relationships between parents and children is crucial during preadolescence in order to effectively target specific behaviors and stem declines in adherence and glycemic control often seen later during adolescence (e.g., Johnson et al., 1992). Addressing specific factors that influence the parent-child relationship like child behavior, parent behavior, and parenting stress through clinical intervention could provide a means of combating deteriorations in T1D management as children enter the teenage years. Findings highlight the importance of intervening at the relationship level, and not solely with children or solely with caregivers. Potential clinical applications could include helping parents manage difficult child behaviors and cope with parenting stress, which would lessen the strain on the parent child relationship and may subsequently improve T1D management as youth transition to adolescence and become more independent in their diabetes care.

Strengths, Limitations and Future Directions

Although, the present sample is somewhat more diverse than is found in current diabetes literature, future research should attempt to include more participants from a diverse range of backgrounds. Increased sample diversity would ensure that findings regarding parent-child relationships are generalizable to the T1D preadolescent population at large. Additionally, primary caregivers were predominantly mothers; the inclusion of fathers and other secondary caregivers would help to further broaden generalizability by providing insight into transactional relationships in T1D management from a wider variety of perspectives.

The present sample was also relatively small ($n=86$), which makes discerning effects of individual variables somewhat difficult. Specifically, the lack of association between psychosocial and medical variables in the present sample may have been influenced by sample size. Unfortunately, recruiting large samples is often difficult within a chronic illness population. Future research exploring associations between psychosocial factors and T1D medical outcomes should utilize a larger sample if possible in order to better distinguish effects as well as address the inconsistent associations presently found in T1D literature.

Exploring associations among child behavior, parenting behavior, and pediatric parenting stress in this cross-sectional sample provides insight into one component of the transactional relationship at a specific time-point. However, the cross-sectional nature of the present study also hinders the ability to identify directionality of findings or causality between variables. Future research regarding child and parent behaviors as well as pediatric parenting stress should further probe associations among these variables to explore directionality and determine causation. Future research would also benefit from longitudinal analysis in order to determine the long-term impact of pediatric parenting stress on the transactional relationship between child and parent behaviors.

Additionally, the internal consistency for the DFBC in the present sample was fair, although also consistent with previous literature. Future research on critical parenting as it relates to child behavior and pediatric parenting stress should utilize a more reliable measure of parenting behaviors. The present study sheds light on the parent-child relationship during preadolescence, a time when parent-child relationships are changing. Since these results demonstrate a partial mediation, future research may benefit from exploring other factors (e.g., self-efficacy, internalizing symptoms, family conflict, etc.), that may play into the relationship between child problem behavior and critical parenting during this important developmental period. Similarly, given the significant correlation between HbA1c and critical parenting, it may also be valuable to explore other child and parent characteristics that could contribute to this finding.

Conclusions

Pediatric parenting stress partially mediates the relationship between problematic child behaviors and critical parenting behaviors. These findings contribute to evidence that parent- and child-factors are related to one another in preadolescents with T1D, and that pediatric parenting stress influences this relationship. Findings highlight one example of the dynamic interaction between parents and preadolescents, present opportunities for future research aiming to further elucidate associations among transactional factors, and highlight a need for further exploration and clarification of associations with T1D management and medical outcomes. Results from such research can be translated into clinical practice in order to target specific difficulties related to T1D management during preadolescence, and consequently could prevent deterioration in adherence and glycemic control during adolescence.

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Figure 1.

Pediatric parenting stress (PIP) partially mediating the relationship between problematic child behaviors (ECBI) and critical parenting (SED)^a

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

a Figure illustrates how pediatric parenting stress partially mediates the relationship between problematic child behaviors and critical parenting. Bold numbers are beta weights of the relationship between the individual constructs. The non-bolded numbers are beta weights for the entire model after pediatric parenting stress has been included.

b Eyberg Child Behavior Inventory

c Pediatric Inventory for Parents

d Diabetes Family Behavior Checklist

Table 1**Demographic and Medical Characteristics (n= 86)**

	%	M (SD)	Range
Child gender (% female)	53.5		
Child age (years)		10.8 (.75)	9.0-11.9
Child ethnicity (%)			
Caucasian	73.0		
African American	18.6		
Hispanic American	4.7		
Asian American	2.3		
Other	1.2		
Annual household income (%)			
< \$24,999	7.5		
\$25,000-49,999	15.0		
\$50,000-74,999	20.0		
\$75,000-99,999	10.0		
\$100,000-124,999	25.0		
\$125,000-149,999	6.3		
\$150,000	16.3		
Insulin regimen (% basal/bolus)	44.0		
Critical parenting behaviors		17.3 (5.59)	8-35
ECBI problem score		7.82 (7.70)	0-30
PIP difficulty score		79.9 (25.4)	42-158
Blood glucose checks (per day)		4.55 (1.59)	2-9
HbA1c (%)		8.14 (1.28)	5.4-11.9
Illness duration (years)		4.20 (2.64)	.72-10.7
Primary caregiver gender (% female)	93.0		
Primary caregiver marital status (%)			
Married	74.1		
Divorced	12.9		
Never Married	7.1		
Separated	4.7		
Widowed	1.2		
Primary caregiver education (%)			
< High School	2.4		
High school	30.6		
Some college	20.0		
College degree	34.1		
Graduate or professional degree	13.1		

Table 2

Correlations between study variables

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	Mean (SD)	Range
1. Child's gender	1											
2. Age	.01	1										
3. Ethnicity ^a	.20	.09	1									
4. Average annual household income	.01	.08	.32**	1								
5. Insulin Regimen ^b	.07	-.05	.22*	.37**	1							
6. Critical parenting behaviors	.14	.06	-.17	-.27*	-.28*	1					17.32 (5.59)	8-35
7. ECBI problem score	.29**	-.07	.05	-.22*	-.18	.31**	1				7.83 (7.70)	0-30
8. PIP difficulty score	.02	-.08	.06	-.43**	-.19	.33**	.56*	1			79.89 (25.41)	42-158
9. Average # of BG checks	-.11	-.12	.02	.24*	.30**	-.13	-.03	-.04	1		4.55 (1.59)	2-9
10. Hemoglobin Ale	-.04	.20	-.15	-.22+	-.09	.27*	.08	.07	-.21+	1	8.14(1.28)	5.4-11.9

* $p < .05$ ** $p < .01$ + $p = .05$ ^a Ethnicity dummy coded in reference to Caucasian^b Insulin regimen dummy coded in reference to basal/bolus regimen