Families With Children With Diabetes: Implications of Parent Stress for Parent and Child Health

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Objective To examine the relation of parent stress to parent mental health and child mental and physical health. Methods We interviewed children with type 1 diabetes (n = 132; mean age 12 years) annually for 5 years and had one parent complete a questionnaire at each assessment. Parents completed measures of general life stress, stress related to caring for a child with diabetes, benefit finding, and mental health. Child outcomes were depressive symptoms, self-care behavior, and glycemic control. Multilevel modeling was used to examine concurrent and longitudinal relations. Results Greater parent general stress and greater parent diabetes-specific stress were associated with poorer parent mental health. Overall, greater parent general stress was associated with poorer child outcomes, whereas greater parent diabetes-specific stress was associated with better child outcomes. Conclusions Families with high levels of general life stress should be identified as they are at risk for both poor parent and child health outcomes.

Key words parenting; stress; type 1 diabetes.

There is a large psychological literature on the lives of youth with type 1 diabetes and the psychosocial factors that influence their health (see Nansel & Hood, 2008; Wysocki, Greco, & Buckloh, 2003, for reviews). However, there is much less research on the effect of having a child with diabetes on the lives of parents. The diagnosis of a chronic illness or disability, such as type 1 diabetes, in a child leads to family upheaval and reorganization (Patterson & Garwick, 1998). The effects of this stress on parents not only may adversely affect parents’ mental health but also could affect the health of the child with diabetes. According to family systems theory, what happens to a target member of the family affects other family members and their response in turn affects the target family member (Cohen, 1999; Patterson & Garwick, 1998). Family systems theory assumes that behavior takes place in an interpersonal context. Not only does the family affect diabetes, but diabetes affects the family. This is consistent with the transactional model of parent–child interactions, in which children affect parents and parents affect children (Sameroff & Chandler, 1975).

Utilizing family systems theory and transactional model perspectives, the present study had two goals. First, we examined the relations of parent stress to parent mental health. Second, we examined the relation of parent stress to the health of the child with diabetes. We distinguished between two sources of parent stress: (a) general stress (not specific to caring for a child with diabetes) in the areas of finances, marriage, and parenting and (b) stress related to caring for a child with diabetes, or diabetes-specific stress.

Effect of Childhood Diabetes on Parents

Being a parent of a child with a chronic illness or disability is associated with psychological distress (Zelikovsky, Schast, & Jean-Francois, 2007). In a study that compared parents of children with cancer, asthma, cystic fibrosis, and type 1 diabetes, parents of children with type 1 diabetes and asthma reported greater parenting stress but less worry about their child’s health compared to other parents.
Parents seem to report more stress in the area of social disruption, emotional strain, and financial strain when the child’s condition is associated with unpredictable symptoms (Dodgson et al., 2000), which is the case with diabetes. Parents also may experience greater stress when managing the child’s illness requires a lot of time and energy. This also is the case with diabetes, as there is an intensive management plan that must be executed daily, which includes blood glucose monitoring, insulin administration, careful monitoring of diet, and exercise—all of which potentially involve parents. Although it is clear that parental involvement in diabetes management benefits the health of the child with diabetes (Grey, Davidson, Boland, & Tamborlane, 2001; Helgeson, Reynolds, Siminerio, Escobar, & Becker, 2008), this may come at a psychological cost to parents.

Studies have found that a diabetes diagnosis in a child is associated with psychological distress among parents. A study of newly diagnosed children with diabetes showed that nearly one-fourth of mothers and fathers met DSM-IV criteria for posttraumatic stress disorder six weeks postdiagnosis (Landolt et al., 2002). A case–control study showed that parents of children with diabetes have greater parenting strain than parents of nonchronically ill children (Powers et al., 2002). Parents may feel overwhelmed by the demands of taking care of a child with diabetes while juggling the eating patterns and activities of other family members—all of which need to accommodate the child’s diabetes (Mellin, Neumark-Sztainer, & Patterson, 2004). Parents’ stress related to caring for a child with diabetes has been linked to increased parent anxiety (Lewin et al., 2005), decreased hope, and reduced feelings of self-efficacy (Mitchell et al., 2009).

However, the effect of having a child with diabetes on parents’ psychological health is not uniformly negative. Many parents cite positive aspects of having a child with diabetes, ranging from increased family closeness, to improved family health habits, to improvements in the child’s psychosocial profile (e.g., more conscientious, more mature; Mellin et al., 2004). Although these benefits are not articulated by family systems theory or the transactional model of parent–child interactions, they are consistent with the idea that the child’s illness affects the family in many ways. These benefits are consistent with a large literature on growth or benefit finding following stressful or traumatic life events (Helgeson, Reynolds, & Tomich, 2006; Tedeschi & Calhoun, 1995). According to this literature, some people respond to stressful life events by making positive life changes or construing benefits. The literature is mixed, however, as to whether benefit finding is related to good psychological health (Helgeson et al., 2006).

**Relation Between Parent Stress and Child Health**

Consistent with the family systems theory perspective, parent stress not only may have adverse effects on parents’ psychological health but also may have adverse effects on the child’s health. Parents who are stressed may become overwhelmed by their responsibilities and withdraw from helping the child manage diabetes, or parents may respond to their distress by exerting more control over the child’s diabetes care. Parent depression is associated with an increase in parents’ focus on their own needs and a reduced focus on the child’s concerns (Dix, Gershoff, Meunier, & Miller, 2004). Depressed parents interact in more negative and less supportive ways with children; they are more disengaged and more intrusive (Dix et al., 2004; Lovejoy, Gracyzky, O’Hare, & Neuman, 2000). The effects of parent depression and general distress on children may depend on whether the stress arises from caring for a child with diabetes or from other life domains. Research has failed to disentangle the two. One study showed that higher stress related to caring for a child with diabetes was related to greater parental involvement in diabetes (Streisand, Swift, Wickmark, Chen, & Holmes, 2005). Another showed that general maternal trait anxiety was associated with adolescents perceiving their mothers as controlling and overprotective (Cameron, Young, & Wiebe, 2007). When parent involvement in diabetes care is viewed as collaborative, children benefit; when parent involvement is viewed as controlling, children—especially older ones—do not (Wiebe et al., 2005).

Research has examined the relation of parent stress to child outcomes, but findings are not clear. Cross-sectional studies have linked greater parent diabetes-specific stress to poorer glycemic control (Streisand et al., 2005) and better glycemic control (Stallwood, 2005). A cross-sectional study found no link between parent stress and child glycemic control (Mitchell et al., 2009), whereas a longitudinal study linked greater maternal trait anxiety to poorer glycemic control among younger but not older adolescents 3 months later (Cameron et al., 2007). A 9-month longitudinal study linked parent depression at study start to greater burden in managing diabetes six months later, and this burden subsequently predicted poor glycemic control at 9 months (Cunningham, Vesco, Dolan, & Hood, 2011). However, neither of these longitudinal studies adjusted for baseline values of glycemic control in the analyses.

Parent stress also may be related to child psychological difficulties. Parent diabetes-related stress has been related to child internalizing and externalizing problems (Lewin...
et al., 2005), and general parenting stress (not related to caregiving for an illness) has been related to child depression (Mullins et al., 2007). In one sense, these findings are paradoxical. Parent stress has been linked to greater parental involvement in the management of diabetes—and research has shown that parental involvement is linked to good diabetes outcomes (Helgeson et al., 2008), but parent stress also may be associated with poor child psychological and physical health.

One reason for the seemingly paradoxical effects of parent stress on child outcomes may have to do with the fact that the majority of research in this area is cross-sectional. These studies do not determine whether parent stress leads to poor child health or whether poor child health leads to increased parent stress. Research on children with disabilities has shown that parenting stress is lower when children are adjusting better (Weiss, Sullivan, & Diamond, 2003) and having fewer difficulties (Podolski & Nigg, 2001). When children are not doing well, parent–child conflict may erupt over how self-care behavior is managed, and parent–child conflict over self-care is associated with poor outcomes (Anderson et al., 2002; Ingerski, Anderson, Dolan, & Hood, 2010). Because the present study is longitudinal, we are able to examine whether parent stress predicts changes in child health or child health predicts changes in parent stress.

A second reason for the contradictory findings could be that some studies measure parent general stress, such as financial stress or marital stress unconnected to diabetes, and some measure stress associated with caring for a child with diabetes. Whereas general life stress may detract from involvement in diabetes care, stress related to caring for a child with diabetes may motivate involvement in diabetes care. In the present research, we examine both parent general stress and parent diabetes-specific stress.

Present Study

We conducted a 5-year longitudinal study of children with type 1 diabetes, who were enrolled when they were 12 years old on average. The study consisted of annual interviews with the child with diabetes while the primary caregiver, typically the mother, completed a questionnaire. We measured parent stress, parent mental health, and child health. First, we examined whether parent stress had implications for parent mental health—distinguishing between general stress related to finances, marriage, and parenting and diabetes-specific stress related to caring for a child with type 1 diabetes. We hypothesized that both sources of parent stress would be related to poor parent mental health. We also measured parent benefit finding and hypothesized that parent benefit finding would be related to good parent mental health. Second, we examined the relation between parent stress and child health, hypothesizing that general parent stress would be associated with adverse child outcomes—specifically, increased child depressive symptoms, poor self-care behavior, and poor glycemic control. We examined the association of parent diabetes-specific stress to the same outcomes, but did not make a prediction as to the direction of that relation. Parent diabetes-specific stress may be related to poorer child outcomes if parent stress interferes with care or to better child outcomes if parent stress increases parent involvement in care. Since the data were longitudinal, we conducted lagged analyses in which we examined whether parent stress predicted changes in child health and whether child health predicted changes in parent stress.

Method

Participants

We enrolled 132 adolescents with type 1 diabetes (53% female) and their parent or primary caregiver (92% mothers, 7% fathers, 1% grandmother) into the study. Families were eligible to participate in the study if the adolescent was in the fifth, sixth, or seventh grade. Child ages ranged from 10.70 to 14.21 years, with a mean of 12.08 (SD = 0.73); parents ages ranged from 27 to 56 years, with a mean of 40.31 (SD = 5.80). The majority of children (93%) and parents (94%) were white. Nearly three-quarters (74%) of the children lived with both their biological mother and father. The four factor Hollingshead index (1975) of social status (mother and father education and occupation) revealed an average family score of 41.97 (SD = 11.05), which reflects the lower end of technical workers, medium business, and minor professionals. Adolescents with diabetes had the illness between 1 and 13 years, with an average of 4.91 (SD = 2.97) years.

Procedure

Families were recruited from a local Children’s Hospital. Letters of invitation (n = 307) were sent to families of adolescents with type 1 diabetes who were approximately 11- to 13-years old. We wanted to enroll participants during early adolescence and follow them over the transition through middle adolescence. Of these, 20 families returned postcards refusing contact about the study. Of the remaining 287 families, we reached 261 and determined that 171 were eligible (diagnosed with type 1 diabetes for at least 1 year prior to enrollment and no other major chronic
illness). Of the eligible families, 132 (77%) agreed and 39 refused.

The study was approved by the Institutional Review Boards of the involved institutions. Parental consent and child assent were obtained in person at the time of the initial [Time 1 (T1)] interview. Adolescents were interviewed annually for five years in the General Clinical Research Center immediately before or after their regular clinic appointment, while parents completed a questionnaire in another room. Retention over the five years was excellent. Of those enrolled in the study at T1, participation rates for children were 96% at Time 2 (T2); 95% at Time 3 (T3); 96% at Time 4 (T4); and 95% at Time 5 (T5). Since the study’s primary focus was on the children, participation rates of parents were somewhat lower but still high: 98% at T1, 94% at T2, 91% at T3, 89% at T4, and 91% at T5.

**Instruments**

All instruments were administered at each of the five waves of assessment unless otherwise specified.

**Parent General Stress**

We measured stress in three domains: financial, marital, parenting (not specific to diabetes). We used the 4-item financial stress and 4-item parental stress subscales from Norris and Uhl’s (1993) chronic stress measure, and the five-item marital stress scale from Lepore (1992). Parents responded to each item on a 5-point scale (1 = never; 5 = very often) with respect to the past six months. To reduce the number of analyses, we examined the feasibility of computing a general stress measure. The internal consistencies of this 13-item index were high at all waves of assessment (α’s ranged from .79 to .83). Items are shown in Table 1.

**Parent Diabetes-Specific Stress**

We used the Impact on Family Scale (Stein & Jessop, 2003; Stein & Riessman, 1980) to measure the strain associated with caring for a child with a chronic illness. To reduce the length of our survey, we used abbreviated measures of three subscales that measured family strain, personal strain, and social strain by choosing the items with the highest loadings from the original factor analysis (see Table 1; Stein & Riessman, 1980). The family domain reflects the impact caring for a child with diabetes has on the family. The personal strain reflects the personal burden of caring for a child with diabetes. The social domain reflects how the child’s diabetes limits the parent’s social activities. Parents indicated their agreement with each item on 5-point scales (1 = strongly disagree; 5 = strongly agree) with respect to their current situation. To reduce the number of analyses, we combined items from all scales into a single diabetes-specific stress index. Other studies using the full inventory have summed across domains and analyzed total scores (e.g., Bonner, Hardy, Willard, & Hutchinson, 2007; Thon & Ullrich, 2010; Woods, Himle, & Osman, 2005). The internal consistency of the total index was good: α’s ranged from .67 to .80.

### Table 1. Parent General and Diabetes-Specific Stress

<table>
<thead>
<tr>
<th>Parent General Stress Index: Financial Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Did you have enough money to afford the kind of clothing or food you or your family should have?</td>
</tr>
<tr>
<td>2. Did you have trouble meeting the monthly payments on bills?</td>
</tr>
<tr>
<td>3. Did financial problems put an extra burden on you?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marital Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Were you upset with your spouse?</td>
</tr>
<tr>
<td>5. Did you have an disagreement with your spouse</td>
</tr>
<tr>
<td>6. Did you and your spouse criticize each other?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parent Diabetes-specific Stress Index: Family Strain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Our family gives up things because of my child’s illness.</td>
</tr>
<tr>
<td>2. I don’t have much time left over for other family members after caring for my child.</td>
</tr>
<tr>
<td>3. Sometimes we have to change plans about going out at the last minute because of my child’s illness.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personal Strain</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Sometimes I feel like I live on a rollercoaster: in crisis when my child is acutely ill, OK when things are stable.</td>
</tr>
<tr>
<td>5. I live from day-to-day and don’t plan for the future.</td>
</tr>
<tr>
<td>6. Fatigue is a problem for me because of my child’s illness.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Social Strain</th>
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<tbody>
<tr>
<td>7. We see family and friends less because of my child’s illness.</td>
</tr>
<tr>
<td>8. We have little desire to go out because of my child’s illness.</td>
</tr>
<tr>
<td>9. Because of my child’s illness, we are not able to travel out of the city.</td>
</tr>
</tbody>
</table>

**Benefit finding Index:**

1. Because of my child, I am more accepting of things.
2. My child is responsible for my learning patience.
3. Because of my child, I have learned to adjust to things I cannot change.
4. My child is why I am a more responsible person.
5. The presence of my child helps me do things as they come.
6. My child is the reason my life has better structure.
7. Learning to manage my child’s diabetes has given me a sense of competence.
8. Because of my child, our family has become closer.
The general stress and diabetes-specific stress indices were modestly to moderately correlated at each wave of assessment: $r = .20, p < .05$; $r = .44, p < .01$; $r = .26, p < .01, r = .43, p < .001$; $r = .23, p < .05$.

Parent Benefit Finding
We used eight items to measure benefits from having a child with diabetes from Behr, Murphy, and Summers’s (1991) positive contributions scale (Table I). These items loaded highest on the strength and family closeness and the personal growth and maturity scales. The internal consistency of this scale was high at all times: alphas ranged from .70 to .82. The diabetes-specific stress index was unrelated to benefit finding at four of the five assessments ($r$’s ranged from $-.06$, $ns$ to $.28, p < .01$). The general stress index was positively related to benefit finding at four of the five assessments ($r$’s ranged from $.02$ to $.33, $p < .001$).

Parent Mental Health
Since parents were not the primary focus of the larger study, which was aimed at determinants of adolescent adjustment to diabetes (Helgeson et al., 2008), we did not include measures of parent mental health at T1. We administered the Center for Epidemiological Depression Inventory (Radloff, 1977) to parents at T2, T3, T4, and T5. Internal consistencies were good at all waves ($\alpha$’s ranged from .71 to .91). At T3, we added the Satisfaction with Life Scale to measure life satisfaction (Diener, Emmons, Larsen, & Griffin, 1985). Internal consistencies were high at the three waves: .91, .91, and .90, respectively.

Child Depressive Symptoms
Children completed the abbreviated form of the Children’s Depression Inventory (Kovacs, 2001). $\alpha$’s ranged from .70 to .81.

Child Self-Care Behavior
We measured self-care behavior in two ways. First, we downloaded data from children’s blood glucose meters, which they brought to the clinic to determine the frequency of blood glucose monitoring. In 16% of the cases, we relied on patient logbooks to document frequency of monitoring because we had difficulty with the software for downloading the data (78%) or because adolescents forgot to bring their meters to the clinic (22%).

On average, meters (and logbooks) contained about two months of data (mean number of days ranged from 59 to 67 across the five waves; SD’s ranged from 23 to 50). We calculated the average number of meter readings taken per day. The average number per day over the course of the study was about 4 (means ranged from 3.71 to 3.88; SD’s ranged from 1.38 to 1.57).

Second, we administered a modification of the widely used 14-item Self-Care Inventory to both children and parents (La Greca, Swales, Klemp, & Madigan, 1988; Lewin et al., 2009). The instrument has high internal consistency, has high test–retest reliability, is related to interview-based measures of adherence, and is related to good glycemic control (Lewin et al., 2009). Respondents are asked how well they followed their physician’s recommendations for glucose testing, insulin administration, diet, exercise, and other diabetes-related behaviors. Each item is rated on a 1 (never do it) to 5 (always do this as recommended) scale. We updated this scale by adding 8 more contemporary items, as described in Helgeson et al. (2008). Our revised measure was correlated .94 with La Greca’s original scale at T1. The internal consistency was adequate at all times for adolescents ($\alpha$’s ranged from .70 to .78 and parents ($\alpha$’s ranged from .83 to .86). Although adolescent and parent versions were moderately correlated at each assessment ($r = .40, p < .001; r = .49, p < .001; r = .54, p < .001; r = .56, p < .001; r = .41, p < .001), there was sufficient distinction to warrant examination of each as separate outcomes.

Glycemic Control
Glycemic control was measured with hemoglobin A1C (HbA1C) obtained at the clinic appointment measured by HPLC (Tosoh Instruments) with normal range of 4.6–6.1%. HbA1C values indicate the average blood glucose level over the past 2–3 months. The average HbA1C for our sample was 8.04 at T1 (SD = 1.31) and 8.90 at T5 (SD = 1.83). Higher numbers indicate worse glycemic control. Current HbA1C recommendations for 13- to 19-year-old adolescents are below 7.5% (American Diabetes Association, 2008).

Overview of the Analyses
We used multilevel modeling (MLM; Singer & Willett, 2003) with HLM-6 (Raudenbush, Bryk, Cheong, & Congdon, 2004) first to address whether parent stress predicts parent mental health and second to examine the relation between parent stress and child health.
MLM has numerous advantages over ordinary least squares (OLS) regression. First, with MLM, one is able to take advantage of all available data including data from participants who missed an assessment. Thus, if a participant missed one or two assessments, his or her data from the other assessments were included in the analyses. Second, MLM can be used when one expects variables to be correlated across time, a substantial improvement over OLS, which assumes that this autocorrelation is zero. Finally, MLM allows one to examine individual variability in rates of change. The rate of change is calculated for each individual and aggregated across individuals. We have a two-level model such that wave of assessment or time (level 1) is nested within person (Level 2). With MLM, we can examine two sources of change. First, we can examine changes over time within an individual, such as whether parent depressive symptoms increase or decrease over time (i.e., the Level 1 model). Second, we can examine whether individual difference variables influence these trajectories of change over time, such as whether the change in depressive symptoms over time is larger for parents with higher or lower levels of social status (i.e., the Level 2 model). We met the assumptions of MLM in terms of number of units at the Levels 1 and 2 models, interval level-dependent variables, and normally distributed and uncorrelated residuals.

**Stress Prediction of Parent Mental Health**

When examining whether parent stress predicts mental health, we had two outcomes (parent depressive symptoms, parent life satisfaction). As suggested by Singer and Willett (2003), we began each analysis by fitting the unconditional means model. This model tests whether or not there is variation in the outcome that is worth exploring. This was the case for both outcomes. We examined whether parent social status, parent sex, parent race, parent age, child sex, child age at diagnosis, child diabetes duration, household structure, and child insulin delivery method were related to outcomes. Since parent social status, parent age, and household structure were related to one or both outcomes, we controlled for these variables in all analyses. All three variables were added to the Level 2 model because they were viewed as person characteristics, measured once at baseline. We examined the relation of parent stress at each wave of assessment to the outcome measured at the same time, an analysis that we refer to as the concurrent multilevel model, by adding the general parent stress index and the parent diabetes-specific stress index to the Level 1 model. We also added parent benefit finding to the Level 1 model to see if it predicted parent mental health.

The equation for this model is listed below:

\[
DV_{ti} = \beta_{00} + \beta_{01} \text{social status}_i + \beta_{02} \text{parent age}_i + \beta_{03} \text{household structure}_i + \beta_{10} \text{general stress}_i + \beta_{20} \text{diabetes-specific stress}_i + \beta_{30} \text{benefit finding}_i + r_{0i} + e_{0i}
\]

The intercept, \(\beta_{00}\), represents the outcome at the initial wave of data collection. \(\beta_{01}, \beta_{02},\) and \(\beta_{03}\) represent the slopes of the relation between the Level 2 variables, social status, parent age, and household structure, to the outcome. \(\beta_{10}\) through \(\beta_{30}\) represent the slope of the relations of the Level 1 stress variables and benefit finding to the outcome. The remaining two parameters reflect error terms: \(r_{0i}\) reflects the between-person (Level 2) residual in the initial rate of the outcome and \(e_{0i}\) represents the within-person (Level 1) residual or variability.

To examine longitudinal or lagged relations, we examined the relation of parent stress at \(T_n\) to parent mental health at \(T_{n+1}\) controlling for parent mental health at \(T_n\). For depressive symptoms, the lagged analyses take into consideration three lags: \(T2–T3; T3–T4; T4–T5\). For life satisfaction, the lagged analyses take into consideration two lags: \(T3–T4; T4–T5\). To conduct these analyses, we added a Level 1 term to the equation displayed above that represented the outcome at \(T_n\) so that changes in the outcome are examined.

**Relation of Parent Stress to Child Health**

We used a similar concurrent multilevel model when examining whether parent stress predicts child health. Again, we began by fitting the unconditional means model to each outcome and found that there was sufficient variability in the child health outcomes to examine predictor variables. Since the same three demographic variables (parent social status, age, household structure) were related to child health, they were included in all the equations. For each of the five outcomes (child depressive symptoms, frequency of blood glucose monitoring, child report self-care behavior, parent report self-care behavior, glycemic control), we examined whether three Level 1 variables were predictive: parent general stress, parent diabetes-specific stress, and parent benefit finding.

To examine longitudinal relations, we conducted two sets of lagged analyses. First, to determine whether parent stress predicted changes in child health, we examined the relation of parent stress at \(T_n\) to child health outcomes measured at \(T_{n+1}\) controlling for child health outcomes at \(T_n\). These lagged analyses take into consideration four lags: \(T1–T2; T2–T3; T3–T4; T4–T5\). We added a Level 1
term to the model that represented the child health outcome at \( T_n \) (as described in the previous analysis) so that changes are examined. Second, to determine whether child health predicted changes in parent stress or benefit finding, we examined the relation of child health at \( T_n \), controlling for parent stress at \( T_n \). In this case, we had three outcomes: parent general stress, parent diabetes-specific stress, and parent benefit finding. The Level 1 predictor variables were child depressive symptoms, frequency of blood glucose monitoring, parent report of child self-care behavior, and glycemic control.\(^2\)

### Results

#### Relation of Parent Stress to Parent Mental Health

Using concurrent MLM, parent general stress, diabetes-specific stress, and benefit finding were used to predict parent mental health, with statistical controls for social status, parent age, and household structure. General stress (\( .31, SE = 0.03, p < .001 \)) and diabetes-specific stress (\( .13, SE = 0.03, p < .001 \)) predicted more parent depressive symptoms, but benefit finding did not. Life satisfaction was predicted by lower general stress (\( -.70, SE = 0.10, p < .001 \)), lower diabetes-specific stress (\( -.32, SE = 0.09, p < .001 \)) and greater benefit finding (\( .16, SE = 0.07, p < .05 \)).

In longitudinal (lagged) analyses with the same statistical controls, general stress predicted an increase in parent depressive symptoms (\( .12, SE = 0.04, p < .05 \)) and a decrease in life satisfaction (\( .30, SE = 0.11, p < .01 \)). Neither diabetes-specific stress nor benefit finding was linked to changes in mental health.

#### Relation of Parent Stress to Child Health

The concurrent multilevel models linking parent stress to child outcomes are shown in Table II. Among the control variables, lower social status was related to poorer glycemic control, and two-parent households were associated with more frequent blood glucose monitoring and better self-care behavior as reported by the parent. Parent general stress was significantly associated with more child depressive symptoms, poorer self-care behavior reported by both child and parent, poorer glycemic control, and marginally associated with less frequent blood glucose monitoring. In contrast, parent diabetes-specific stress was associated with more frequent blood glucose monitoring and better self-care behavior as reported by the child. Parent benefit finding was associated with a single outcome—better glycemic control.

Since the cross-sectional analyses do not address whether parent stress leads to changes in child health or child health leads to parent stress, we conducted two sets of lagged analyses. First, we examined whether parent stress predicted changes in child health. Parent general stress predicted a decrease in the frequency of blood glucose monitoring (\( -.26, SE = 0.13, p < .05 \)) and a deterioration in glycemic control (\( .23, SE = 0.08, p < .001 \)). Parent diabetes-specific stress predicted an increase in child depressive symptoms (\( .04, SE = 0.01, p < .01 \)), but also marginally predicted an increase in the frequency of blood glucose monitoring (\( .18, SE = 0.10, p = .08 \)) and significantly predicted improvements in glycemic control (\( -.16, SE = 0.08, p < .05 \)). None of the variables predicted changes in the self-care index, whether reported by child or parent. Parent benefit finding did not predict changes in child health outcomes.

Next, we examined the relation of child health to parent stress/benefit finding. Only a single significant

### Table II. Concurrent MultiLevel Model: Relations of Parent Stress to Child Health (Coefficients and Standard Errors)

<table>
<thead>
<tr>
<th>Depressive symptoms</th>
<th>Monitoring frequency</th>
<th>Child self-care</th>
<th>Parent self-care</th>
<th>Glycemic control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.14 (0.45)***</td>
<td>4.20 (1.08)***</td>
<td>4.28 (0.36)***</td>
<td>4.43 (0.36)***</td>
</tr>
<tr>
<td>Social Status</td>
<td>-0.00 (0.00)</td>
<td>0.02 (0.01)</td>
<td>0.00 (0.00)</td>
<td>0.00 (0.00)</td>
</tr>
<tr>
<td>Parent Age</td>
<td>0.00 (0.00)</td>
<td>-0.01 (0.02)</td>
<td>-0.01 (0.01)</td>
<td>-0.01 (0.01)</td>
</tr>
<tr>
<td>Household Structure</td>
<td>0.00 (0.04)</td>
<td>-0.62 (0.27)*</td>
<td>-0.14 (0.09)</td>
<td>-0.20 (0.09)*</td>
</tr>
<tr>
<td>General Stress</td>
<td>0.03 (0.02)*</td>
<td>-0.24 (0.11)+</td>
<td>-0.08 (0.04)*</td>
<td>-0.19 (0.04)**</td>
</tr>
<tr>
<td>Diabetes-Specific Stress</td>
<td>0.01 (0.02)</td>
<td>0.23 (0.11)*</td>
<td>0.11 (0.04)**</td>
<td>-0.02 (0.04)</td>
</tr>
<tr>
<td>Benefit Finding</td>
<td>-0.01 (0.01)</td>
<td>0.06 (0.09)</td>
<td>0.01 (0.03)</td>
<td>0.04 (0.03)</td>
</tr>
</tbody>
</table>

Note. \(^+ p < .10; * p < .05; ** p < .01; *** p < .001.\)
finding emerged. Parent report of better child self-care behavior was associated with declines in parent general stress (−.09, SE = 0.05, p < .05). Child health variables did not significantly predict changes in parent diabetes-specific stress or parent benefit finding.

Discussion

Consistent with family systems theory (Patterson & Garwick, 1998) and the transactional model of parent–child interactions (Sameroﬀ & Chandler, 1975), we found that caring for a child with diabetes had implications for both parent mental health and the health of the child with diabetes. The links of parent stress to poor parent mental health are consistent with previous research (e.g., Lewin et al., 2005). However, here we distinguished between general life stress and stress related to caring for a child with diabetes, and found that both were associated with increased parent depressive symptoms and decreased parent life satisfaction. Yet, only general stress was related to deterioration in the two mental health outcomes over time. It may be that the general stress domains are more pervasive, affecting multiple areas of one’s life, compared to the diabetes-specific stress domains. Thus, although caring for a child with diabetes was linked concurrently to poor mental health among parents, there was no evidence from this sample that diabetes-specific stress had cumulative negative effects on parents over time. Future research should distinguish among different domains of general stress and diabetes-specific stress and examine other aspects of diabetes that could affect parent mental health, such as the stress the child with diabetes experiences due to the illness.

In terms of child health, parent general stress was the more robust predictor of outcomes, underscoring the necessity of considering the general life context in which diabetes takes place. Parent general stress was related to higher levels of child depressive symptoms, poorer self-care behavior, and worse glycemic control. Parent general stress also predicted a decline in the frequency of blood glucose monitoring and deterioration in glycemic control over time. There are several possible explanations for these findings. First, parent general stress may translate into a stressful environment for the child, causing distress in the child and distracting the child from appropriate self-care. Second, parent general stress may affect how the parent interacts with the child. As noted earlier, numerous studies have shown that parent distress leads to more negative and less positive interactions with children (Lovejoy et al., 2000), including an observational study of parents and children with diabetes (Jaser & Grey, 2010). Parents who are worried about their finances, their marriage, and taking care of their family may have little time left over to assist a child with a demanding chronic illness. Future research should use ecological momentary assessment methods to examine the proximal effects of parent stress on parent–child interactions.

It is fortunate that parent diabetes-specific stress was not related to adverse changes in parent mental health over time because diabetes-specific stress was typically related to good health outcomes for children. Parent diabetes-specific stress was associated with more frequent blood glucose monitoring and better glycemic control over time. These findings are compelling, in part, because neither outcome is based on self-report. Thus, when parents report that their life is more disrupted by caring for a child with diabetes, the child’s physical health benefits.

Why would this be the case? It may be that parents who report greater personal, social, and family disruption due to a child’s diabetes are parents who are more involved in the diabetes self-care regimen. Although this involvement takes time and energy on the part of parents and interferes with other family activities, the involvement may help the child. Numerous studies have shown that parental involvement in diabetes care is associated with good child health (Grey et al., 2001), especially when the involvement is shared between parent and adolescent (Helgeson et al., 2008) or collaborative (Wiebe et al., 2005). Thus, one possibility is that parent general stress is detrimental for children because it reduces parental involvement in diabetes care and parent diabetes-specific stress is beneficial for children because it motivates parental involvement in diabetes care. Since we had some measures of parental involvement in diabetes care (Helgeson et al., 2008), we conducted an exploratory test of these post hoc hypotheses. We found that parent general stress was related to reduced shared (joint parent/child) responsibility for diabetes care (−.04, SE = 0.01, p < .005), and parent diabetes-specific stress was related to greater parent-only responsibility for diabetes care (−.04, SE = 0.01, p < .001). Neither was related to child-only responsibility. Mediational analyses, using Bauer, Preacher, and Gil’s (2006) calculation of indirect and direct effects for multilevel models, showed that shared responsibility significantly mediated the relation of parent general stress to child and parent reports of self-care behavior (child report; indirect = −.03, p < .01; parent report; indirect = −.03, p < .01). That is, parents who reported greater general life stress were less likely to be jointly involved with their children in managing diabetes which in turn was related to poorer self-care, whether measured
by parent or child report. However, responsibility variables did not explain the links of parent diabetes-specific stress to good child outcomes. Future research should examine the nature of parent–child interactions surrounding diabetes care to further test this possibility.

There is one exception to the relation of parent diabetes-specific stress to good child health. Parent diabetes-specific stress was associated with an increase in child depressive symptoms over time, which is consistent with prior studies that have linked parent stress to child psychological difficulties (Lewin et al., 2005; Mullins et al., 2007). Although parent diabetes-specific stress may translate into children taking better care of their physical health, there may be a psychological cost to the child. Children with diabetes may sense that the family’s life is disrupted and that parents are strained. This realization may be distressing to children.

Is there any reason to believe that parent stress is a reaction to child health rather than a predictor of child health? We suggested that prior cross-sectional work in this area was limited because the causal direction between parent stress and child health could not be examined. Here, we found little evidence to support the idea that child health leads to parent diabetes-specific stress. None of the child health variables were related to changes in parent diabetes-specific stress. There was one predictor of parent general stress: parents who reported that children took better care of their diabetes also reported a decline in general stress over time. When the child is managing his or her diabetes well, this may affect how parents view other domains of life stress.

In addition to the stress associated with caring for a child with diabetes, we explored whether parents who perceive benefits from having a child with diabetes reap psychological benefits for themselves or their child. Parent benefit finding was associated with one of the two parent outcomes—life satisfaction. Parent benefit finding did not predict changes in parent mental health over time. For children, parent benefit finding was not related to child depressive symptoms or self-care but was associated with better child glycemic control. It is not clear why parents who are able to derive something positive from their child’s illness have children in better glycemic control. Parents who derive benefits from their child’s diabetes may approach the illness in a different way; they may be less anxious and better prepared to cope with this life stressor.

Future research needs to examine how parent benefit finding influences the nature of parent–child interactions regarding diabetes. These results must be interpreted with caution, however, as parent benefit finding did not predict changes in glycemic control nor did glycemic control predicted changes in parent benefit finding over time.

These results have implications for healthcare professionals who work with families who have a child with diabetes. The findings regarding general stress suggest that families with high levels of life stress outside of diabetes ought to be identified. Perhaps referrals could be made, or interventions developed, for assistance in these other domains, whether it is marital counseling or financial support, to help alleviate these sources of strain. These other sources of strain may detract from the care of the child with diabetes. The findings for diabetes-specific stress need to be addressed somewhat differently. Parents who appear to be suffering from high levels of personal strain in caring for a child with diabetes ought to be provided with coping resources that alleviate the strain but maintain the parents’ interest and involvement in diabetes care. A cognitive–behavioral intervention could target parents’ distress as well as parent–child interactions revolving around diabetes care. We are unable to determine from these data whether poor parent mental health or high levels of parent stress were in the clinically significant range warranting intervention. The homogeneity of the sample in terms of ethnicity, race, and social status suggests that we may not have tapped the higher ranges of stress. Just as the Yerkes–Dodson Law predicts that moderate levels of arousal/strain maximize performance (Yerkes & Dodson, 1908), it may be that moderate levels of parent distress (or stress) motivates involvement in children’s diabetes care without clinically significant harm to the self.

Conceptual strengths of this study include the focus on parent stress, the implications of parent stress for parent and child health, and the distinction between general stress and diabetes-specific stress. Methodological strengths include the 5-year longitudinal design, the high retention rate of children and parents, the use of MLM, and the collection of data from both children and parents. Study weaknesses include the use of abbreviated parent stress measures, homogeneity of the sample, and the inclusion of only one parent, which was typically the mother. The vast majority of families in this study were Caucasian. Future research should examine ethnic and racial minority families and families of lower social statuses who may face more general and diabetes-specific strains. Children who are racial minorities often have poorer glycemic control than Caucasian children, and parents of racial minorities report both greater general stress and greater diabetes-specific stress than other parents (Cunningham et al., 2011; Streisand et al., 2005). Future research also should examine children of varying ages to determine when parent stress has the strongest effects on children.
Taken collectively, our data supported family systems theory and the transactional model of parent–child interactions in that parent stress affected children and children affected parents. We also extended this work by making the important distinction between the general life stress parents experience and the specific stress they experience from caring for a child with diabetes. Parents who report high levels of general stress report poorer mental health and have children who fare more poorly in regard to their diabetes. However, the effects of parent diabetes-specific stress are mixed. There is some indication that the stress associated with caring for a child with diabetes is associated with adverse effects on parent and child mental health but is associated with benefits for child physical health. The challenge for practitioners is to reduce the burden of caring for a child with diabetes to alleviate psychological distress but without reducing the level of parent involvement in diabetes care—a likely contributor to good child physical health.

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References


