Protective Factors in Young Children With Type 1 Diabetes

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Abstract

Objective To characterize protective factors in young children with type 1 diabetes, and evaluate associations among child protective factors and indicators of diabetes resilience, including better child and parent psychosocial functioning and glycemic control. Methods Parents of 78 young children with type 1 diabetes reported on child protective factors, child quality of life, parent depressive symptoms, and disease-specific parenting stress. A1c values were collected from medical records. Results Young children with type 1 diabetes were rated as having similar levels of protective factors as normative samples. Greater child protective factors were associated with indicators of diabetes resilience, including higher child quality of life and lower parent depressive symptoms and parenting stress. Regression analyses demonstrated that child protective factors were associated with 16% of the variance in parent-reported depressive symptoms. Conclusions Attention to child protective factors can enhance understanding of adjustment to type 1 diabetes and may have implications for intervention.

Key words: glycemic control; parent stress; resilience; type 1 diabetes; young children.

Introduction

Children aged ≤5 years represent one of the fastest growing populations of patients newly diagnosed with type 1 diabetes (T1D; Vehik et al., 2007). These young children and their parents are faced with many potential challenges that may derail the typical developmental experience and negatively impact both child and parent functioning. Diabetes management for young children requires adherence to a consistent, relatively inflexible schedule of blood glucose monitoring, insulin administration, predictable carbohydrate intake, and supervised physical activity. Acute complications, including hyperglycemia and hypoglycemia, are common (Monaghan, Younge, McCarter, Cogen, & Streisand, 2014). Coupling the complexity of care needed to achieve good glycemic control while simultaneously striving to meet developmental needs, young children with T1D and their parents are at increased risk for psychosocial concerns, including increased depressive symptoms and diminished quality of life (Jaser, Whittemore, Ambrosino, Lindemann, & Grey, 2009; Reynolds & Helgeson, 2011). However, even with the significant demands that diabetes care places on a child and family, many young children and their parents are able to effectively manage T1D-related challenges and thrive despite early diagnosis of a lifelong chronic illness. Greater understanding of protective factors or processes that contribute to resilient outcomes in these young children is needed.

Resilience occurs when a child achieves a positive outcome in at least one domain despite the presence of significant risk factors or adverse events, such as the
diagnosis of a complex and demanding chronic illness. Protective factors such as maturity, self-control, and positive parent–child relationships may influence or reduce the impact of adversity on a child’s development and functioning and contribute to resilient outcomes (Masten, 2001; Masten, Best, & Garmezy, 1990). For youth with T1D and their parents, resilient outcomes include high health-related quality of life, low levels of distress, and good disease management (Hilliard et al., 2012).

Research with children with T1D has largely focused on the presence of risk factors and suboptimal outcomes, such as low quality of life, parent depression or stress, and poor glycemic control, with fewer examinations of positive qualities or resilient indicators (Cohen, Lumley, Naar-King, Partridge, & Cakan, 2004; Hilliard, Monaghan, Cogen, & Streisand, 2011). However, the degree of positive qualities that a child brings to dyadic interactions surrounding diabetes management may be related to both child and parent emotional response to T1D care and may ultimately contribute to glycemic control. There is some evidence to suggest that a child’s positive attitude toward diabetes is viewed as a key contributor to living well with T1D (Ginsburg et al., 2005). Although data are lacking in young children with T1D, research has found that general positive qualities in adolescents with T1D were associated with improved glycemic control, primarily through pathways of better family cohesion and better daily adherence to the diabetes regimen, but this has not been extended to younger children (Mackey et al., 2011).

Child development literature can guide evaluation about specific protective factors present in young children that may influence diabetes outcomes. Protective processes that persist over time, are responsive to intervention, or reside within an individual are thought to be most closely linked with resilient outcomes (Masten, 2001). Thus, possible factors relevant to and measurable in a young child sample include interest in participation in daily activities (initiative), behavioral self-control, and positive relationships with caregivers (attachment), each of which may have important implications for cooperation with diabetes care. Theoretical models of disease management posit that taking initiative in daily activities is critical to good health across development (Schulman-Green et al., 2012) and providing young children with the opportunity to participate in their care has been associated with better T1D adherence and adjustment (Chisholm et al., 2011). Research with preschoolers has found that higher levels of child protective factors are associated with fewer behavioral concerns (Brinkman, Wigent, Tomac, Pham, & Carlson, 2007; Lien & Carlson, 2009), potentially through the path of greater child self-control (Voris et al., 2013). As behavior problems in young children have been associated with greater parent stress and poor glycemic control (Cohen et al., 2004; Hilliard et al., 2011), it is also important to examine the protective potential of self-control. Positive parent–child relationships have been associated with better family response to chronic illness and improved health (Feeney, 2000), and it is likely that the child’s quality of attachment with his/her caregivers influences daily interactions surrounding T1D management (Rosenberg & Shields, 2009). Assessment of these key protective factors in a sample of young children with T1D and related associations with indicators of diabetes resilience is warranted.

This exploratory study is the first to evaluate general protective factors in a sample of young children with T1D and identify associations with general and diabetes-specific child and family indicators of resilience. As this construct has not been specifically evaluated in young children with T1D, we present preliminary description of protective factors in this vulnerable population and provide comparisons with a normative sample. We examined associations among three common child general protective factors (initiative, self-control, and attachment), demographic characteristics, and indicators of diabetes resilience (better child quality of life, lower parent-reported depressive symptoms and parenting stress, better glycemic control). We hypothesized that parent report of greater child protective factors would be associated with indicators of resilience in the context of the many stressors and challenges of T1D in young children.

Methods
Participants
Participants included 78 parents of young children (ages 2–5 years) diagnosed with T1D. Participants for this multisite trial were recruited from three diabetes care centers in the Mid-Atlantic and Midwest for enrollment in a randomized controlled trial (RCT) of a supportive intervention designed to promote T1D management and parental adjustment. The larger trial included parents of young children aged 1–7 years who were diagnosed with T1D for at least 6 months; data from a subset of participants (aged 2–5 years) were used for the current study owing to the limited age range for which the Devereux Early Childhood Assessment (DECA) is validated. Additional inclusion criteria included English fluency and absence of other child chronic medical conditions or developmental disability. Enrolled participants completed baseline data collection by telephone, an in-person orientation, five phone calls related to intervention content or education content, and follow-up data collection by telephone at three follow-up time points (1, 6, and 12 months postintervention). The current study included baseline data collected before randomization.
Procedure
Institutional review board approval was obtained from each participating site. Potentially eligible participants were mailed an informational letter detailing study procedures and offering the opportunity to opt out of contact with the research team. Participants who did not opt out of contact were called by a research assistant to further assess eligibility, explain study procedures, and obtain initial consent. Participants who provided verbal consent were invited to complete baseline questionnaires by telephone and meet with a study team member to complete written consent and an in-person orientation session. Participants were then randomized to either the intervention group or the education-only control group.

The study team mailed recruitment letters to 285 potentially eligible parents and 219 (77%) were reached by phone. Of the 219 parents, 203 (93%) were eligible for participation and 167 (82%) expressed initial interest in participating; the most common reasons for declining participation were concerns about the study’s time commitment and a lack of interest. One hundred thirty-four parents (80%) completed all baseline and consent procedures and were randomized. The DECA, the primary measure of protective factors administered for the current study, is only validated for use with children aged 2–5 years. Thus, a subsample of the total enrolled sample was used for this study, representing 78 parents of young children aged 2–5 years. All participants received a modest incentive for completion of baseline questionnaires.

Study Measures
Demographic Questionnaire
Parents completed a demographic questionnaire designed for the purposes of this study, including information on child and parent age, gender, and race; parent education, marital status, and household income; and child T1D regimen and illness duration.

Devereux Early Childhood Assessment
Parents completed the DECA (LeBuffe & Naglieri, 1999), a 37-item tool designed to evaluate protective factors, which may foster emotional growth and resilience and related behavioral concerns among young children aged 2–5 years. For the purposes of this study, only the 27 items on the Protective Factors scale were administered, representing three subscale scores (initiative, self-control, and attachment) and a total protective factors score. Example items include: “How often does your child try or ask to try new things or activities?” (initiative); “How often does your child control her/his anger?” (self-control); and “How often does your child show affection for familiar adults?” (attachment). Item frequency is rated on a 5-point Likert scale ranging from 0 = never to 4 = very frequently. Scores are summed across each subscale and raw scores are transformed into T scores for the three subscales and total protective factors score. Each subscale and total T score may also be categorized as a “strength” (T score ≥ 60), “typical” (60 < T score < 40), or a “concern” (T score ≤ 40) factor. Protective factors are conceptualized as a continuous construct, so DECA T scores are often used for descriptive and comparison purposes and to evaluate change over time. In addition, categorical scores are used to interpret the meaning of the T scores and can help prioritize interventions to promote or maintain existing strengths or to strengthen areas of relative weakness (LeBuffe, Ross, Fleming, & Naglieri, 2013). Reliability estimates are good, with internal consistency ranging from .76 to .91 (Lien & Carlson, 2009), and intrarater reliability ranging from .55 to .80 (Bracken, Keith, & Walker, 1998). Reliability estimates for this sample were adequate (total protective factors α = .86; initiative α = .71; self-control α = .82; attachment α = .64).

Pediatric Quality of Life Inventory
Participants completed the Pediatric Quality of Life Inventory (PedsQL) Generic Core (Varni, Seid, & Kurtin, 2001), a parent-report measure used to assess child’s quality of life in the past month. Parents completed either a toddler (for ages 2–4 years; 21 items) or young child version (for ages 5–7 years; 23 items). The PedsQL has four subscales assessing physical, emotional, social, and academic functioning. A Generic Core score is calculated using all items. Items are rated on a 5-point Likert scale ranging from 0 = never to 4 = almost always, are reverse scored, and linearly transformed to a 0–100 scale. Higher scores represent better quality of life. The PedsQL Generic Core has been demonstrated to be reliable and valid, with internal consistencies ranging from .86 to .90 (Varni et al., 2001). Internal consistency in this sample was good (toddler Generic Core α = .86; young child Generic Core α = .88).

Center for Epidemiological Studies–Depression Scale
Parents completed the Center for Epidemiological Studies–Depression Scale (CES-D; Radloff, 1977), a 20-item self-report measure of depressive affect, somatic symptoms, positive affect, and interpersonal relations. Items are rated on a 4-point Likert scale from 0 = hardly or none of the time to 3 = most or all of the time and summed. Higher scores indicate greater severity of depressive symptoms. The CES-D has adequate test–retest reliability and correlates well with clinical ratings of depression severity (Bartlett et al., 2001; Radloff, 1977). Internal consistency for this sample was excellent (α = .92).
Pediatric Inventory for Parents–Difficulty Scale
Participants completed the Pediatric Inventory for Parents (PIP-D; Streisand, Braniecki, Tercyak, & Kazak, 2001), a 42-item parent self-report rating of stress associated with caring for a child with a medical illness. Similar to other studies evaluating the magnitude of parent stress (Sulkers et al., 2014), only the Difficulty Scale score was used for this study to capture the perceived stress experience of caring for a child with T1D. Items are rated along a 5-point Likert scale assessing the perceived level of difficulty, ranging from 1 = not at all to 5 = extremely. Ratings are summed for an overall Difficulty score; higher scores indicate greater difficulty with pediatric parenting stress. The PIP-D has been administered to parents of children with T1D (α = .95–.96; Hilliard et al., 2011; Streisand, Swift, Wickmark, Chen, & Holmes, 2005), as well other pediatric conditions (Mullen et al., 2014; Sulkers et al., 2014). Internal consistency for this sample was excellent (PIP-D α = .93).

Glycemic Control
Hemoglobin A1c represents the average glucose level from the past 8–12 weeks and is a commonly used measure of glycemic control (American Diabetes Association, 2013). A1c values were obtained during the course of routine clinical care and extracted from medical charts for the clinic visit closest to the date of baseline questionnaire completion. All assays were conducted with the DCA 2000 Analyzer and used high-performance liquid chromatography to assure comparability between subjects (Tamborlane et al., 2013). A1c values were obtained during the course of routine clinical care and extracted from medical charts for the clinic visit closest to the date of baseline questionnaire completion. All assays were conducted with the DCA 2000 Analyzer and used high-performance liquid chromatography to assure comparability between subjects (Tamborlane et al., 2013).

Analyses
This study used secondary data analyses; the data were drawn from baseline questionnaires administered as part of a larger RCT for parents of young children with T1D (Monaghan, Hilliard, Cogen, & Streisand, 2011; Monaghan et al., 2014). Descriptive statistics were generated to determine the frequency or mean for all study variables. T scores for each DECA subscale and total protective factors were calculated and used as continuous variables representing the degree of protective factors. T scores were also used to classify young children as having an area of concern or strength on each of the DECA subscales and total score. Correlational analyses (Pearson product-moment correlation for two continuous variables; point-biserial correlation for a continuous and a categorical variable; Spearman ρ for continuous and an ordinal variable) were conducted to identify associations among demographic characteristics, child protective factors, and resilient indicators of interest, including better child quality of life, lower parent depressive symptoms, less perceived difficulty with pediatric parenting stress, and good glycemic control (A1c). Analyses of variance or chi square analyses were conducted to evaluate differences in demographic characteristics and resilient indicators by DECA category (concern, typical, or strength) for each subscale and the total protective factors score. Finally, multiple separate hierarchical linear regressions were conducted to evaluate the association of each child protective factor in relation to each indicator of diabetes resilience, controlling for covariates.

Results
Demographic Characteristics, Glycemic Control, and Psychosocial Characteristics
Participants were primarily mothers of young children (M age = 4.44 years) diagnosed with T1D for a mean of 1.76 years. Children were primarily Caucasian (70%). Of the 92% of participants reporting their range for annual household income, distribution was as follows: 15% <$50,000; 36% between $50,000 and $99,999; 41% >$100,000. The majority of young children managed their diabetes using a basal-bolus regimen (n = 55; 70%) of multiple daily injections or an insulin pump; the remainder used a fixed dose insulin regimen without adjustments (n = 23; 30%). Mean A1c was 8.20%. Better glycemic control (i.e. lower A1c) was associated with higher family income (ρ = −.27, p < .05) and married parental status (r pb = −.41, p < .01). Glycemic control was not related to child gender, age, race, or insulin regimen.

Parents rated their young children as having generally good quality of life at levels similar to children without chronic illness (Varni et al., 2001). Parents reported similar levels of depressive symptoms and slightly lower levels of difficulty with pediatric parenting stress compared with other samples of parents of young children with T1D (Hilliard et al., 2011; Jaser et al., 2009). Fourteen parents (18%) reported clinically significant elevated depressive symptoms (CES-D ≥ 16); see Table I.

Child Protective Factors
Parent-reported child general protective factors were evaluated using the DECA. Scores among young children with T1D were comparable with the normative sample, with mean T scores on the initiative (M = 49.38), self-control (M = 49.18), and attachment (M = 48.53) subscales and total protective factors (M = 47.96) all similar to the normative sample mean of 50 (p values > .05). Using the categorical classifications for areas of strength or concern, the distribution was varied; see Table II. Three participants (4%) rated their child in the strength category across all subscales, and one participant (1%) rated their child in the concern category across all subscales.
Child Protective Factors, Demographic Characteristics, and Psychosocial Functioning

Associations among DECA subscale and total protective factors T scores, demographic characteristics, and indicators of child and parent psychosocial functioning were examined; see Table III. Using categorical classifications, non-Caucasian children ($\chi^2(2) = 16.20$, $p < .01$) and children from lower income households ($\chi^2(2) = 13.92$, $p < .01$) were each more likely to have a strength in self-control. A rating of strength or typical in total protective factors was associated with significantly lower parent depression scores than a rating of concern ($F(2, 75) = 9.09$, $p < .01$, $\eta^2 = .20$). A rating of strength or typical in self-control was associated with significantly lower parent depressive symptoms ($F(2, 75) = 12.16$, $p < .01$, $\eta^2 = .25$) and lower pediatric parenting stress ($F(2,75) = 3.86$, $p < .05$, $\eta^2 = .09$) than a rating of concern.

Separate hierarchical multiple regression models were conducted to examine the association of child protective factors with child and parent psychosocial functioning. Demographic variables with a significant association with the dependent variable ($p < .05$) were included in the models. Accounting for race and family income, higher total protective factors significantly contributed to lower parent depressive symptoms and

### Table I. Sample Demographics

<table>
<thead>
<tr>
<th></th>
<th>%</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent sex (% female)</td>
<td>91</td>
<td>35.66</td>
<td>5.54</td>
<td>22.21–50.10</td>
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<tr>
<td>Parent age (years)</td>
<td>69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent education (% ≥ college degree)</td>
<td>86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;$50,000/year</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$50,000–$99,999/year</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥$100,000/year</td>
<td>41</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child sex (% female)</td>
<td>44</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child age (years)</td>
<td>4.44</td>
<td>1.07</td>
<td>2.01–5.99</td>
<td></td>
</tr>
<tr>
<td>Child race</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Hispanic</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Indian</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disease duration (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulin regimen (% basal bolus/pump)</td>
<td>70</td>
<td>1.76</td>
<td>0.90</td>
<td>0.58–4.90</td>
</tr>
<tr>
<td>A1c</td>
<td></td>
<td>8.20%</td>
<td>0.95</td>
<td>6.4%–11.0%</td>
</tr>
<tr>
<td>Pediatric Quality of Life Inventory</td>
<td>82.73</td>
<td>10.10</td>
<td>48.91–97.83</td>
<td></td>
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<tr>
<td>Center for Epidemiologic Studies–Depression</td>
<td>10.05</td>
<td>9.90</td>
<td>0.00–49.00</td>
<td></td>
</tr>
<tr>
<td>Pediatric Inventory for Parents–Difficulty</td>
<td>77.63</td>
<td>23.61</td>
<td>43.00–157.00</td>
<td></td>
</tr>
</tbody>
</table>

### Table II. Summary of Devereux Early Childhood Assessment Scores in a Sample of Young Children (Ages 2–5 Years) With Type 1 Diabetes (n = 78)

<table>
<thead>
<tr>
<th>Scale</th>
<th>M (SD)</th>
<th>Strength (n, %)</th>
<th>Typical (n, %)</th>
<th>Concern (n, %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiative</td>
<td>49.4 (8.1)</td>
<td>10, 13</td>
<td>62, 79</td>
<td>6, 8</td>
</tr>
<tr>
<td>Self-control</td>
<td>49.2 (9.1)</td>
<td>10, 13</td>
<td>56, 72</td>
<td>12, 15</td>
</tr>
<tr>
<td>Attachment</td>
<td>48.5 (9.9)</td>
<td>10, 13</td>
<td>53, 68</td>
<td>15, 19</td>
</tr>
<tr>
<td>Total protective factors</td>
<td>48.0 (8.5)</td>
<td>6, 8</td>
<td>60, 77</td>
<td>12, 15</td>
</tr>
</tbody>
</table>

Note. Strength (T ≥ 60), typical (40 ≤ T ≤ 60), concern (T ≤ 40).

### Table III. Correlations

<table>
<thead>
<tr>
<th>Scale</th>
<th>DECA initiative self-control</th>
<th>Attachment</th>
<th>Total protective factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent sex</td>
<td>.14</td>
<td>.02</td>
<td>.15</td>
</tr>
<tr>
<td>Parent age</td>
<td>.07</td>
<td>.12</td>
<td>-.01</td>
</tr>
<tr>
<td>Parent educationa</td>
<td>.03</td>
<td>.09</td>
<td>.25*</td>
</tr>
<tr>
<td>Parent marital statusb</td>
<td>.00</td>
<td>-.06</td>
<td>.05</td>
</tr>
<tr>
<td>Household incomea</td>
<td>.03</td>
<td>-.01</td>
<td>.12</td>
</tr>
<tr>
<td>Child sexb</td>
<td>.24*</td>
<td>.01</td>
<td>.13</td>
</tr>
<tr>
<td>Child age</td>
<td>.21</td>
<td>.18</td>
<td>-.13</td>
</tr>
<tr>
<td>Child raceb</td>
<td>.15</td>
<td>.23*</td>
<td>.00</td>
</tr>
<tr>
<td>Disease durationb</td>
<td>.04</td>
<td>.01</td>
<td>-.11</td>
</tr>
<tr>
<td>Insulin regimenb</td>
<td>.13</td>
<td>.04</td>
<td>-.01</td>
</tr>
<tr>
<td>A1c</td>
<td>.16</td>
<td>.04</td>
<td>.00</td>
</tr>
<tr>
<td>PedsQL</td>
<td>.20</td>
<td>.31*</td>
<td>.11</td>
</tr>
<tr>
<td>CES-D</td>
<td>-.30**</td>
<td>-.36**</td>
<td>-.16</td>
</tr>
<tr>
<td>PIP-D</td>
<td>-.23*</td>
<td>-.29*</td>
<td>-.01</td>
</tr>
</tbody>
</table>

Note. Parent and child sex: 1 = male, 2 = female; marital status: 1 = married, 2 = not married; child race: 1 = Caucasian, 2 = non-Caucasian; insulin regimen: 1 = conventional, 2 = intensive (basal/bolus).

DECA = Devereux Early Childhood Assessment; PedsQL = Pediatric Quality of Life Inventory; CES-D = Center for Epidemiologic Studies–Depression Scale; PIP-D = Pediatric Inventory for Parents.

aSpearman $\rho$.
bPoint-biserial correlation.

*p < .05; **p < .01.
the overall model was associated with 16% of the variance in parent depressive symptoms ($F(3, 74) = 6.01, p < .01$; adjusted $R^2 = 16.3$). Regression models examining the contribution of child protective factors to child quality of life and pediatric parenting stress were not significant.

**Post Hoc Analyses on Self-Control**

As self-control appears to be one of the most salient child protective factors, based on current literature and categorical associations in this sample with parent depressive symptoms and pediatric parenting stress, separate hierarchical linear regressions were conducted using the self-control subscale of the DECA. Controlling for race and family income, higher child self-control significantly contributed to lower parent depressive symptoms; the overall model was associated with 17% of the variance in parent depressive symptoms ($F(3, 74) = 6.36, p < .01$; adjusted $R^2 = 17.3$). Further, higher child self-control significantly contributed to better child quality of life; the overall model was associated with 7% of the variance in child quality of life ($F(3, 74) = 2.78, p < .05$; adjusted $R^2 = .07$).

**Child Protective Factors and Glycemic Control**

Correlational analyses examining DECA characteristics and A1c were not significant; see Table III. Children with a categorical strength in self-control were more likely to have a poorer glycemic control ($F(2, 75) = 5.06, p < .01$) as compared with children who were typical in this area. Separate hierarchical multiple regression models were conducted to examine the contribution of child protective factors to A1c. Controlling for marital status, race, and family income, the overall model evaluating protective factors and A1c was significant ($F(4, 72) = 9.61, p < .01$; adjusted $R^2 = .31$); however, total protective factors was not a significant factor beyond the addition of family income. The same pattern was found when examining self-control and A1c ($F(4, 72) = 9.51, p < .01$; adjusted $R^2 = .31$).

**Discussion**

This study is among the first to examine protective processes in young children with T1D. Results are encouraging. Even faced with the significant adversity of a chronic illness at a young age, children with T1D were rated similar to peers without diabetes in three key protective factors: initiative, self-control, and attachment. There were few differences based on demographic characteristics, supporting the universality of these strengths among children.

Total child protective factors were positively correlated with child quality of life and inversely correlated with parent-reported depressive symptoms and difficulty with pediatric parenting stress. Further, the DECA self-control subscale was positively correlated with child quality of life, and initiative and self-control subscales were inversely correlated with parent depressive symptoms and pediatric parenting stress. Behavioral self-control may be associated with less refusal with or greater adaptation to diabetes-related tasks, and initiative may facilitate openness to engaging in T1D-related tasks, although further research to support these possible links is needed. Given previous findings relating positive parent–child relationships to diabetes health (Monaghan, Horn, Alvarez, Cogen, & Streisand, 2012), it was surprising that attachment subscale scores were not associated with any indicators of diabetes resilience in this sample. The general attachment measured by the DECA may not tap into the same construct as later parent–child relationships, or it may be that positive relationship qualities directly related to T1D management such as warmth and empathy in daily T1D care are more relevant to indicators of diabetes resilience in this context than general attachment. The attachment subscale also had lower reliability than the other subscales ($\alpha = .64$), suggesting that the items may not have been as relevant for the current sample.

Using regression analyses, child protective factors were associated with a significant proportion of the variance in parent-reported depressive symptoms. Given that prior research has found that approximately 20% of parents of young children with T1D report elevated depressive symptoms (Hilliard et al., 2011; Jaser et al., 2009), this enhanced understanding of potentially modifiable factors associated with parent emotional functioning above and beyond demographic characteristics is valuable. Although parents complete most T1D management tasks for young children, the diabetes experience is a transactional process. Hilliard and colleagues found that higher levels of parent anxiety and stress were associated with more frequent child misbehavior (a negative outcome) in young children with T1D (Hilliard et al., 2011). A recent systematic review also noted that parent psychological distress was associated with higher child-reported stress and lower quality of life (Whittemore, Jaser, Chao, Myoungock, & Grey, 2012). However, to date there has not been evidence to support that the protective pathway also holds for young children with T1D—that greater protective factors are associated with better quality of life and lower distress. Current findings complement prior research and highlight the potential contributions of young children’s positive characteristics and behaviors to resilient indicators.

Few significant relations were found between child protective factors and glycemic control. It is possible that effects may be more evident over time or that protective factors have a more immediate impact on
family T1D management behaviors, which in turn impact later glycemic control. Surprisingly, a child strength in self-control was associated with poorer glycemic control. Non-Caucasian race and lower family income were also associated with higher ratings of self-control. The association between self-control and A1c was largely accounted for by race and household income. Other studies have found that urban youth are rated higher in self-control compared with norms, suggesting that community factors contribute to perceived self-control (Bender, Fedor, & Carlson, 2011). In population-based studies of youth with T1D, Hispanic and African American youth are at increased risk for poor glycemic control, and lower socioeconomic status predicts poor glycemic control regardless of race (Gallegos-Macias, Macias, Kaufman, Skipper, & Kalishman, 2003; Petitti et al., 2009).

Items on the self-control scale assess a child’s ability to do things for independently, make decisions, engage in new activities, and manage emotions. Thus, it is also possible that children rated higher in self-control may be given premature responsibility for T1D care, as cooperating with diabetes-related tasks or managing frustration well could lead parents to entrust more diabetes tasks to a child before they were developmentally ready to manage such responsibilities. However, this was not evaluated in the current study. Given this study’s sample size and demographics, future research should evaluate associations among child protective factors, responsibility for diabetes care, and glycemic outcomes over time in a larger, more diverse sample to draw conclusions about the relations and their mechanisms.

Protective processes are modifiable and could be a target of intervention; teaching positive parenting and reducing parenting stress may lead to increased resilient outcomes in young children. There are several empirically supported programs targeting protective social-emotional skills in young children in the classroom and home settings, largely composed of differential attention to positive behaviors and cognitive-behavioral strategies (McCabe & Altamura, 2011). For example, the Triple P Parenting Program and Parent Child Interaction Therapy are two examples of successful interventions in promoting healthy parent—child interactions and reducing behavioral concerns, and both may also enhance self-control and attachment (Thomas & Zimmer-Gembeck, 2007). The DECA is part of a social–emotional preschool program that aims to bolster strengths and has been associated with an increase in child protective factors (Garbacz, Zychinski, Feuer, Carter, & Budd, 2014; Lamb-Parker, LeBuffe, Powell, & Halpern, 2008; LeBuffe et al., 2013). As part of this strengths-promotion program, the categorical classifications are used to guide individual classroom interventions to build on or maintain each child’s areas of relative strength (LeBuffe et al., 2013). Such intervention approaches could be adapted to focus on protective behaviors related to T1D. For example, parents can be coached to identify and praise children’s positive behaviors or strengths, and to recognize efforts related to initiative or self-control as related to diabetes care, instead of praising the outcome (e.g., specific glucose value).

DECA scores were moderately associated with parents’ self-reported depressive symptoms and stress reported in this sample, similar to previous findings linking parental stress with problem behaviors in young children with T1D (Hilliard et al., 2011). It is possible that parents with elevated stress or depressive symptoms perceived their child’s behavior as more negative, independent of their child’s actual level of current functioning, which may skew findings (Hood, 2009). Scores falling in the concern range in self-control scale or total protective factors may suggest the need to assess and possibly provide support related to parents’ own emotional well-being (e.g., Monaghan et al., 2011).

This study is exploratory and has a number of limitations, including a cross-sectional design and a relatively well-resourced and high functioning sample. Parents participating in baseline data collection had agreed to participate in a rigorous RCT, and the sample may reflect parents with the time and emotional resources to commit to participation in such research. Parents completed all questionnaire data, reflecting both on their own experiences and those of their young children. Obtaining additional informant reports, such as a second caregiver or a teacher, may potentially decrease the risk for biased responding. It is challenging to get self-report data from young children, yet multimethod assessment approaches are recommended (Carter, Briggs-Gowan, & Davis, 2004). A more objective evaluation of positive qualities, such as behaviorally coding a scripted parent–child interaction task or observation of a diabetes routine such as a family meal (Patton et al., 2004), may provide more insight into both parent and child positive qualities and behaviors. Parents also represented predominantly Caucasian mothers with relatively high reported family income. Although this sample is consistent with other samples of young children with T1D and may be even slightly more diverse (Jaser et al., 2009; Patton et al., 2004), the influence and role of protective processes may be more apparent in families faced with multiple adversities in addition to T1D, and this construct should be evaluated in a more at-risk sample. Questionnaires assessed general protective factors; evaluation of diabetes-specific protective factors may demonstrate a stronger association with indicators of resilience. Even when significant, protective factors were associated with a relatively small percentage of variance in psychosocial indicators. However, while protective processes may not fully account for
differences among key diabetes outcomes, they should be considered in combination with risk factors and other relevant variables to obtain a more balanced picture of both negative and positive factors that impact the lives of young children and their families.

Results suggest that assessment of child strengths can contribute to the overall conceptualization of family adaptation to T1D and promote health and well-being. Identification of protective factors indicated in the disease process may inform targets for intervention in families struggling with adjustment to T1D at a young age. Longitudinal research can examine how protective factors present in early childhood map on to later protective processes in youth with T1D to better understand the cascading effects of risk and protection on resilient outcomes in across development (Masten & Cicchetti, 2010). Training caregivers, including family members, teachers, and health-care providers, to recognize and build on young children’s unique strengths may lay the foundation for confident, effective family and self-management throughout childhood and beyond.

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