General Quality of Life in Youth With Type 1 Diabetes

Relationship to patient management and diabetes-specific family conflict

Lori M.B. Laffel, MD, MPH
Alexa Connell, BA
Laura Vangsness, BA
Ann Goebel-Fabbri, PhD
Abigail Mansfield, MA
Barbara J. Anderson, PhD

OBJECTIVE — To evaluate self-report and parent proxy report of child/teen general quality of life in youth with type 1 diabetes, compare their responses with those of a general pediatric population, and identify relationships between diabetes management, diabetes-related family behavior, and diabetes-specific family conflict with quality of life in youth with type 1 diabetes.

RESEARCH DESIGN AND METHODS — Study participants included 100 children, 8–17 years of age (12.1 ± 2.3), with type 1 diabetes for 0.5–6 years (2.7 ± 1.6). Each child and a parent completed the Pediatric Quality of Life Inventory (PedsQL), completed the Diabetes Family Conflict Scale, and provided data on parent involvement in diabetes management. An independent measure of adherence to treatment assessed by the patient's clinician and a measure of glycemic control (HbA1c) were also collected.

RESULTS — PedsQL responses from youth with type 1 diabetes were stable over 1 year and similar to norms from a healthy standardization sample for all three scales of the PedsQL: total, physical, and psychosocial quality of life. After controlling for age, duration of diabetes, sex, HbA1c, and family involvement, child report of diabetes-specific family conflict (P < 0.01) was the only significant predictor of child report of quality of life (model R² = 0.21, P < 0.02).

CONCLUSIONS — Youth with type 1 diabetes report remarkably similar quality of life to a nondiabetic youth population. Greater endorsement of diabetes-specific family conflict predicted diminished quality of life for the child. As treatment programs focus on intensifying glycemic control in youth with type 1 diabetes, interventions should include efforts to reduce diabetes-specific family conflict in order to preserve the child's overall quality of life.

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Increasing numbers of youth with diabetes require intensive treatment programs to reduce the development of complications. Intensive management increases the burdens placed on routines and relationships of children and their families (1–3). Thus, understanding how both diabetes and its treatment influence the child’s quality of life becomes important (4,5). Intensive treatment of type 1 diabetes often disrupts a child’s usual activities, requires disease-focused behaviors from the child and family, and potentially impacts overall quality of life (4–6). Consequently, it becomes important to evaluate overall quality of life of the child with diabetes, considering disease management, physical symptoms, and normal developmental milestones, including school performance and social-emotional development (1,7–10).

This report focuses on general quality of life in youth with type 1 diabetes. Prior investigations have often used a diabetes-specific questionnaire, the Diabetes Quality of Life for Youth (DQOLY), developed by Ingersoll and Marrero (6). The DQOLY is adapted from the adult-oriented quality of life measure used in the Diabetes Control and Complications Trial (11). While the DQOLY provides information about diabetes-specific quality of life in adolescents (12), it does not capture the child’s quality of life with respect to normal social-emotional and physical development for comparison with healthy, normative youth (11). More recently, Varni et al. (13) developed and evaluated another diabetes-specific instrument, the Pediatric Quality of Life Inventory (PedsQL) 3.0 Diabetes Module, which measures diabetes-specific, health-related quality of life across a broader age range.

To examine general quality of life with a focus on social-emotional and physical development and to compare quality of life between youth with type 1 diabetes and healthy children, we utilized a “generic” quality of life tool, the PedsQL, also developed by Varni and colleagues (14,15). The PedsQL distinguishes healthy children from pediatric patients with either acute or chronic conditions if those conditions and treatments impact significantly on the child’s general quality of life. The PedsQL is the only empirically validated pediatric instrument with item and scale construct consistency and both child and parent proxy reports across a broad age range (13–15).

Our study evaluates the PedsQL self-report and parent proxy report of general quality of life in youth with type 1 diabetes of short duration and compares responses to a general, healthy pediatric population. The analysis also examines relationships between diabetes management tasks and diabetes-related family behaviors with overall quality of life. Finally, the study assesses the stability of child report and parent proxy report of quality of life over 1 year. We hypothesized that youth with type 1 diabetes, and
General quality of life with type 1 diabetes

their parents by proxy report, would report significantly lower general quality of life compared with a normative sample of nondiabetic youth. Next, we believed that the child’s perception and the parent proxy report of quality of life would be negatively influenced by the intensity of the diabetes treatment program and by the level of diabetes-specific family conflict. Finally, we hypothesized that quality of life would stabilize or improve over time as patients and families adjusted to diabetes treatment.

RESEARCH DESIGN AND METHODS

Recruitment procedures

Study participants included parents and their children/adolescents with type 1 diabetes who were 8–17 years old, had duration of type 1 diabetes of 0.5–6 years, and had at least one outpatient visit to our center in the past year with intention to return. Patients with relatively short duration were selected to capture any major impact of diabetes on quality of life. Families were approached by letter and recruited at the next regularly scheduled appointment, when the parent and child met with a trained research assistant who obtained written informed consent and assent, respectively. Eligible patients and families were sequentially approached until 104 agreed to participate (81% participation, 104 of 128 approached). Parents from families refusing participation were on average 1.5 years older than participants, with an average age of 13.6 ± 2.8 (mean ± SD) vs. 12.1 ± 2.3 years (P < 0.02). There were no significant differences in duration of diabetes or glycemic control between refusing and participating patients. Most nonparticipating parents (80%) cited they were not interested; the remainder (20%) stated they did not have enough time to complete questionnaires. Four of the 104 participants had incomplete data and were excluded from analyses. The Committee on Human Studies approved the protocol.

Procedures

At the routine diabetes visit, the research assistant conducted a structured, 10- to 15-min, joint interview (patient and parent) to gather demographic information and assess diabetes management tasks during the preceding month. Each child and a parent also completed questionnaires twice, once at baseline and 1 year later (12.4 ± 3.3 months), which included the PedsQL (14) and Diabetes Family Conflict Scale (16). These questionnaires took ~15 min to complete. The child’s clinician completed an interval history, physical examination, and brief diabetes adherence scale (17).

Measures

Child quality of life. Quality of life was assessed by the PedsQL, which measures the child’s and parent’s perceptions of the child’s comprehensive quality of life, with two subscales of physical and psychosocial functioning. The measure, given in separate child and teen self-report and parent proxy forms, takes ~5 min to complete and has been shown to be reliable and valid (15). The PedsQL consists of 23 items scored using a five-point Likert scale (0 = never a problem, 1 = almost never a problem, 2 = sometimes a problem, 3 = often a problem, and 4 = almost always a problem). Responses are scored as follows: 0 scored as 100, 1 as 75, 2 as 50, 3 as 25, and 4 as 0. Total quality of life score results from averaging all items. The physical functioning score is the average of eight items and the psychosocial functioning score is the average of 15 items encompassing emotional, school, and social functioning areas. Therefore, all scale and subscale scores range from 0 to 100 (highest quality of life).

Diabetes-specific family conflict. Each child and a parent completed a revised version of the Diabetes Family Conflict Scale (16) to assess the degree of family conflict in 19 management tasks. Previous reports revealed excellent reliability and internal validity for both parent and child responses (16,18). In this measure, the level of family conflict over diabetes-specific tasks was rated on a three-point scale with 1 = never argue, 2 = argue a fair amount, and 3 = always argue. We chose, however, to sum the number of items in which any level of conflict was acknowledged (2 or 3), because the impact of social desirability on responses makes it difficult to distinguish a meaningful difference between families reporting responses of 2s and 3s. Therefore, scores could range from 0 to 19, with 19 indicating conflict on all items.

Clinician-rated adherence scale. To assess treatment adherence, the patient’s clinician completed the adherence scale developed by Jacobson et al. (17). The scale was modified to account for modern approaches to treatment with a focus on blood glucose monitoring and insulin therapy. The clinician observed the monitoring data from logbooks or meter downloads and provided a daily monitoring frequency. Adherence to insulin therapy was based on clinician impression and lab results. The authors previously confirmed the reliability and validity of the scale (17,19) against a standard measure of treatment adherence (20).

Parental involvement in type 1 diabetes management. We assessed parent involvement in the patient’s diabetes care using a semiquantitative interview with parent and child. We previously developed this structured, joint interview to assess the division of responsibility for diabetes management within families during a typical day (21). The system involved coding components of family behaviors around the separate acts of insulin administration and blood glucose monitoring to assign responsibility to the child, parent, or both. Interrater reliability of the coding system ranged 85–98%. Details of the interview and coding have been previously reported (21,22).

Glycemic control

At each medical visit, HbA1c was measured by high-performance liquid chromatography (ref. range 4.0–6.0%, Tosoh 2.2; Tosoh, Foster City, CA).

Statistical analysis

Statistical analysis was performed with SAS version 8 for Windows (SAS Institute, Cary, NC). Means ± SD are presented unless otherwise indicated. The analyses included paired t tests to compare quality of life from baseline with 1-year surveys. Unpaired t tests compared quality of life scores between the type 1 diabetic and normative groups and between the youth self-reports and parent proxy reports. Predictors of general quality of life were examined by ANOVA, Pearson bivariate correlations, χ2, and multivariate analyses. Univariate analyses were examined first; the complex relationships among developmental, behavioral, and biologic variables called for multivariate analyses to control for potential confounding covariates.
RESULTS

Patient characteristics
Baseline demographic and diabetes-related information appears in Table 1. Mean age was 12.1 ± 2.3 years, and mean duration of diabetes was 2.7 ± 4.6 years. Over half (55%) of the participants were prepubertal (Tanner 1), 33% were pubertal (Tanner 2–4), and 12% were postpubertal (Tanner 5). The majority of participants (85%) resided with two parents and had middle-income socioeconomic backgrounds, and 7% were from ethnic or racial minority groups (23).

According to clinician report, most participants (66%) monitored blood glucose four or more times daily, 27% monitored three times daily, and 7% monitored two or less times daily. Most received two injections of insulin per day (53%), 41% received three per day, and 6% received four per day (including one insulin pump user). HbA1c (8.4 ± 1.2%) was not related to number of daily injections.

Quality of life reported by youth with type 1 diabetes and their parents
We examined child total quality of life scores and physical functioning and psychosocial functioning subscales. There were no significant correlations at baseline or after 1 year between total quality of life reported by either child or parent with the child’s age, family’s socioeconomic status, education level of parents, duration of diabetes, number of daily injections, total daily insulin dosage (units kg⁻¹ day⁻¹), or frequency of blood glucose monitoring. Parent proxy report of physical functioning quality of life subscale was significantly correlated with HbA1c only at baseline (r = −0.22, P < 0.05; higher reported physical functioning associated with lower HbA1c). Parent report of physical functioning subscale was also correlated with child’s BMI (r = 0.21, P < 0.05). Although BMI was significantly correlated with age (older children were larger), age was not correlated with parent proxy report of physical functioning. Therefore, the correlation between parent report of physical functioning subscale and BMI may be meaningless.

We also examined youth and parent proxy reports of total quality of life according to age and duration strata. The older group (ages 13–17 years; n = 34) and younger group (ages 8–12 years; n = 66) reported similar quality of life. Furthermore, the group with longer duration (>2 years; n = 62) compared with the group with shorter duration (≤2 years; n = 38) had similar quality of life scores. Also, child and parent proxy reports did not differ according to child’s sex.

There were also no associations between quality of life and issues related to management. The level of parent involvement in either blood glucose monitoring or insulin injections assessed by interview was not correlated with total quality of life at baseline or 1 year. There were also no differences in child or parent proxy report of quality of life for youth with greater treatment adherence (blood glucose monitoring more than three times daily) compared with less adherence (three or less times daily) or for youth with better control (HbA1c <9%) compared with poorer control (HbA1c ≥9%).

Child reports were correlated with parent proxy reports at baseline for total quality of life (r = 0.41, P < 0.0001) and the subscales (physical functioning, r = 0.41, P < 0.0001; psychosocial, r = 0.39, P < 0.0001). After 1 year, we observed similar correlations (total quality of life, r = 0.31, P < 0.01; physical functioning, r = 0.37, P < 0.01; psychosocial, r = 0.28, P < 0.01).

Stability of child and parent proxy reports over 1 year
The PedsQL appeared very stable in these youth with type 1 diabetes and their parents (Table 2). Correlations of baseline and 1-year data revealed strong consistency for child report (total quality of life, r = 0.57, P < 0.0001; physical functioning, r = 0.48, P < 0.0001; psychosocial functioning, r = 0.57, P < 0.0001) and for parent proxy report (total quality of

Table 1—Demographic and diabetes-related information by age-group

<table>
<thead>
<tr>
<th>Age-group</th>
<th>Total group</th>
<th>Younger (8–12 years)</th>
<th>Older (13–17 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>100</td>
<td>66</td>
<td>34</td>
</tr>
<tr>
<td>Demographic data</td>
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<td></td>
</tr>
<tr>
<td>Age (years) *</td>
<td>12.1 ± 2.3</td>
<td>10.7 ± 1.5</td>
<td>14.6 ± 1.2</td>
</tr>
<tr>
<td>Duration (years)</td>
<td>2.7 ± 1.6</td>
<td>2.8 ± 1.7</td>
<td>2.6 ± 1.5</td>
</tr>
<tr>
<td>Sex (% male)</td>
<td>53</td>
<td>52</td>
<td>53</td>
</tr>
<tr>
<td>Developmental stage (%) *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prepubertal (Tanner 1)</td>
<td>55</td>
<td>82</td>
<td>3</td>
</tr>
<tr>
<td>Pubertal (Tanner 2–4)</td>
<td>33</td>
<td>18</td>
<td>62</td>
</tr>
<tr>
<td>Postpubertal (Tanner 5)</td>
<td>12</td>
<td>0</td>
<td>35</td>
</tr>
<tr>
<td>BMI †</td>
<td>20.5 ± 3.5</td>
<td>19.8 ± 3.6</td>
<td>21.9 ± 3.3</td>
</tr>
<tr>
<td>Single parent families</td>
<td>15</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Mother’s occupational code ‡</td>
<td>3.4 ± 1.5</td>
<td>3.7 ± 1.5</td>
<td>3.0 ± 1.2</td>
</tr>
<tr>
<td>Father’s occupational code</td>
<td>2.3 ± 1.3</td>
<td>2.4 ± 1.3</td>
<td>2.2 ± 1.1</td>
</tr>
<tr>
<td>Diabetes-specific data</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Insulin (units kg⁻¹ min⁻¹)</td>
<td>0.9 ± 0.3</td>
<td>0.9 ± 0.2</td>
<td>0.9 ± 0.3</td>
</tr>
<tr>
<td>Injections per day (%) ‡</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>53</td>
<td>62</td>
<td>35</td>
</tr>
<tr>
<td>Three</td>
<td>41</td>
<td>35</td>
<td>50</td>
</tr>
<tr>
<td>Four</td>
<td>68</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Frequency of BGM/day (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero to two</td>
<td>7</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Three</td>
<td>27</td>
<td>26</td>
<td>29</td>
</tr>
<tr>
<td>Four</td>
<td>59</td>
<td>61</td>
<td>59</td>
</tr>
<tr>
<td>Five or more</td>
<td>7</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>HbA1c (%)</td>
<td>8.4 ± 1.2</td>
<td>8.4 ± 1.2</td>
<td>8.3 ± 1.0</td>
</tr>
</tbody>
</table>

Data are means ± SD unless otherwise indicated. Occupational code: 1 = major professional (physician, lawyer); 3 = skilled worker; 6 = unemployed/retired. *p < 0.001 younger vs. older group, †p < 0.01 younger vs. older group; ‡p < 0.05 younger vs. older group; §one patient on insulin pump therapy. BGM, blood glucose measurement.
life, \( r = 0.51, P < 0.0001 \); physical functioning, \( r = 0.35, P < 0.005 \); psychosocial functioning, \( r = 0.39, P < 0.0001 \). However, comparison of mean scores for child report of total quality of life (mean difference = 2.2 ± 0.2, \( P < 0.05 \)) and the psychosocial subscale (mean difference = 2.6 ± 0.4, \( P < 0.05 \)) revealed modest but statistically significant improvement over 1 year (Fig. 1A).

Comparison of quality of life between type 1 diabetic and normative samples

There were no differences in quality of life as reported by youth with type 1 diabetes and published norms from a healthy pediatric sample (15) (Table 2, Fig. 1B). There were significant but small differences between our sample and the healthy sample for parent proxy reports of total quality of life (\( t = 4.59, df = 814, P < 0.0001 \)) and the psychosocial subscale (\( t = 6.01, df = 814, P < 0.0001 \)).

Relationship between quality of life and diabetes-specific family conflict

At baseline, we found significant correlations between child (4.76 ± 3.77) and parent (3.31 ± 3.28) report of diabetes-specific family conflict with quality of life (child, \( r = -0.32, P = 0.001 \); parent, \( r = -0.24, P < 0.02 \)). One year later, both child (4.11 ± 3.70) and parent (3.05 ± 3.50) report of diabetes-specific family conflict remained correlated with quality of life (\( r = -0.46, P = 0.001 \) and \( r = -0.25, P < 0.05 \), respectively). In a multivariate analysis of baseline data, child report of diabetes-specific family conflict (\( P < 0.01 \)) was the only significant predictor of total quality of life (model \( R^2 = 0.21, P < 0.02 \), controlling for age, duration, sex, HbA1c, and parent involvement with insulin administration (Fig. 2). The 1-year data also confirmed child report of diabetes-specific family conflict (\( P = 0.01 \)) as the only significant predictor of total quality of life. In a multivariate model using parental responses, similar trends of association (\( P = 0.09 \)) between diabetes-specific family conflict and parent proxy report of child’s total quality of life were found.

CONCLUSIONS — The PedsQL required only 5 minutes for satisfactory completion by all youth and parents, and responses appeared reproducible over 1 year. Interestingly, our sample of patients with type 1 diabetes reported similar quality of life to a previously reported nondiabetic population of youth (15). It seems remarkable that despite the recurrent and often painful disruptions associated with insulin injections, blood glucose checks, and frequent snacks, youth with diabetes do not perceive a compromised quality of life. The parents of youth with type 1 diabetes, however, reported a slightly lower, statistically significant, quality of life compared with parents from the nondiabetic sample. This difference arose from lower scores on the psychosocial subscale, which assessed parental perception of the child’s adjustment at school and level of social and emotional functioning. Other investigators have also reported that while children with diabetes generally do not have severe psychological problems (24,25); when they do struggle, it is often in the social-emotional and peer relationship areas of functioning (26,27). Nonetheless, the remarkable similarity in general quality of life between youth with type 1 diabetes and a healthy sample contrasts with a recent report of quality of life from 106 severely obese youth (28). Using the PedsQL, Schwimmer et al. (28) reported diminished child report and parent proxy report of quality of life, with quality of life for the obese youth being similar to that reported by youth diagnosed with cancer.

In multivariate analyses, diabetes-specific family conflict predicted quality of life in our patients with type 1 diabetes. Children who reported higher diabetes-specific family conflict reported lower overall quality of life and lower physical functioning and psychosocial subscale scores; parental responses revealed similar trends. Parents may avoid socially undesirable responses and, in turn, may underreport diabetes-specific family conflict. Parents may also be unaware that their child may be experiencing negative interactions within the family around diabetes management. This may diminish the relation between parent report of diabetes-specific family conflict and parent proxy report of child’s quality of life. Age, sex, disease duration, characteristics of diabetes treatment, and HbA1c did not predict quality of life. Indeed, the child’s report of diabetes-specific family conflict remained the only significant predictor of quality of life at baseline and 1 year later.

Similar to other studies (24,25), we found no relationship between quality of life and glycemic control. In the Diabetes Control and Complications Trial, quality of life did not differ between intensive and conventional treatment groups (29). Our findings suggest that it is not the intensity of treatment, but the intensity of the experienced family conflict around diabetes management, that relates to the child’s report of quality of life. Our data do not confirm causality, as it is possible that youth with higher quality of life tend to

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Table 2 — Mean PedsQL scores for baseline and after 1 year in a type 1 diabetic sample compared with a normative sample

<table>
<thead>
<tr>
<th></th>
<th>Type 1 diabetes baseline</th>
<th>Type 1 diabetes 1 year later</th>
<th>Normative sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child*</td>
<td>83.0 ± 11.1†</td>
<td>85.1 ± 10.9</td>
<td>83.0 ± 14.8</td>
</tr>
<tr>
<td>Parent</td>
<td>81.5 ± 13.7†</td>
<td>81.5 ± 12.7</td>
<td>87.6 ± 12.3</td>
</tr>
<tr>
<td>Physical subscale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child*</td>
<td>86.5 ± 13.3</td>
<td>87.8 ± 11.3</td>
<td>84.4 ± 17.3</td>
</tr>
<tr>
<td>Parent</td>
<td>88.4 ± 16.2</td>
<td>86.4 ± 15.0</td>
<td>89.3 ± 16.4</td>
</tr>
<tr>
<td>Psychosocial subscale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td>81.1 ± 11.9</td>
<td>83.6 ± 12.3</td>
<td>82.4 ± 15.5</td>
</tr>
<tr>
<td>Parent</td>
<td>78.2 ± 14.18</td>
<td>78.9 ± 14.4†</td>
<td>86.6 ± 12.8</td>
</tr>
</tbody>
</table>

Data are means ± SD. For the child normative sample, \( n = 401 \); for the parent normative sample, \( n = 717 \) for all three scores. For the child type 1 diabetic sample, baseline and 1 year, \( n = 100 \). For the parents of the child diabetic sample, baseline \( n = 99 \) and 1 year \( n = 100 \). *Baseline child report for total quality of life and the psychosocial subscale in the type 1 diabetic sample were significantly (\( P < 0.05 \)) different from the 1-year reports; †parent baseline versus normative sample for total quality of life score; ‡parent 1 year later versus normative sample for total quality of life score; §parent baseline versus normative sample for psychosocial subscale; ¶parent 1 year later versus normative sample for psychosocial subscale; four above comparisons were significant, \( P < 0.0001 \).
experience less family conflict in general and less diabetes-specific family conflict.

The PedsQL (15) does not directly address issues related to nutrition and exercise, two fundamental components of diabetes management that are primary to a child’s sense of spontaneity and well-being. A diabetes-specific measure such as the DQOLY may uncover relationships between management behaviors or glycemic control with self-perceived quality of life. In a cross-sectional, multicenter study of >2,100 youth with type 1 diabetes, Hoey et al. (30) reported that better glycemic control was significantly associated with higher adolescent-rated diabetes-specific quality of life according to the DQOLY (6). Interestingly, few adolescents in that study rated diabetes as having a major negative impact on their lives.

Using the DQOLY, Gray et al. (25) reported that general family factors, such as warmth, cohesion, and adaptability, were not the primary “drivers” of quality of life for adolescents with type 1 diabetes, while diabetes-specific family behaviors as assessed by the Diabetes Family Behavior Scale (31) did correlate with quality of life. Our results complement the research of Gray et al. and suggest that diabetes-specific family factors (i.e., diabetes-specific family conflict) are strongly related to overall quality of life in youth with diabetes (25).

Diabetes-specific family conflict may detract from the child’s general quality of life if parents criticize the child around diabetes management tasks such as blood glucose monitoring, insulin administration, and coordination of meal planning and exercise. Thus, parent involvement in diabetes care may be fertile ground for family conflict. We, however, have demonstrated that family engagement in diabetes management does not increase diabetes-specific conflict when involvement includes positive family communication (22,32). Our current findings

Figure 1—A: Quality of life in the type 1 diabetic sample at baseline (■) and 1 year later (▲). Child-reported quality of life were similar at baseline and after 1 year for the type 1 diabetic sample. The total and psychosocial scores were significantly higher after 1 year compared with baseline data (P < 0.05). B: Quality of life in healthy, normative sample (□) and type 1 diabetic sample (▲). Child-reported quality of life in healthy, normative sample and type 1 diabetic sample (baseline) were similar. Comparisons of the normative population with the 1-year data from the diabetes sample were similar to baseline.
suggest that it is not the level of involvement but instead the degree of diabetes-specific family conflict that impacts the child’s perception of quality of life.

Generalizing these findings warrants caution because our study population consisted of a homogeneous group of youth with type 1 diabetes of fairly short duration (2.7 ± 1.6 years) who received specialized care at a tertiary center. Indeed, diabetes management may impact quality of life in patients with longer duration of diabetes or who lack the medical and socioeconomic resources available to our patients. Furthermore, we utilized a general measure of quality of life rather than a diabetes-specific measure of quality of life that could limit our ability to identify facets of diabetes management that negatively impact quality of life. Moreover, we administered the surveys in a waiting room, which could possibly encourage parents and children to underreport their true distress. Nonetheless, the consistency of findings over 1 year reinforces our findings. Finally, although quality of life reported by youth with type 1 diabetes matches that reported by Varni’s normative sample, we are unable to compare demographics between the two populations. Our observations warrant replication in a larger, longitudinal study in which both general and diabetes-specific quality of life can be examined across wider age ranges, disease durations, and socioeconomic status.

Together, our findings and those of Gray et al. (25) emphasize that “potentially modifiable” diabetes-related family interactions (as opposed to more generic family traits) are appropriate targets for clinical interventions aimed at optimizing the well-being of youth with type 1 diabetes. As the medical community works to intensify blood glucose control, interventions that call for family support of diabetes management should include efforts to reduce diabetes-specific family conflict in order to preserve the child’s overall quality of life.

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