Brief Report: Parenting Styles, Regimen Adherence, and Glycemic Control in 4- to 10-Year-Old Children With Diabetes

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Objective: To examine relationships among parenting styles, regimen adherence, and glycemic control for preschool and elementary school children who have Type I diabetes.

Methods: Parents of 55 children with diabetes completed parenting style and regimen adherence questionnaires. Glycosylated hemoglobin results were collected by chart review.

Results: Parental warmth was associated with better adherence ratings. Regression analyses showed that parental warmth explained 27% of the variance in adherence ratings. Parental restrictiveness was associated with worse glycemic control in univariate analyses. However, only Black ethnicity, not adherence or parenting variables, predicted glycemic control. Black ethnicity and lower socioeconomic status (SES) were associated with more parental restrictiveness and worse glycemic control.

Conclusions: These results suggest that authoritative parenting, characterized by support and affection, may be advantageous for the regimen adherence and glycemic control of school-age and younger children with diabetes. Demographic characteristics are important and require further study in this context.

Key words: Type I diabetes mellitus; parenting; regimen adherence; glycemic control; children.

Few studies have focused on young children with Type I diabetes mellitus. Yet, now that the Diabetes Control and Complications Trial (DCCT) has shown that attainment of good glycemic control can prevent the incidence or progression of complications of diabetes, there is even more reason to focus attention on the determinants of glycemic control in all individuals with diabetes, especially young children likely to experience longer disease duration (DCCT Research Group, 1994). During preschool and elementary school, children learn important skills relevant to diabetes self-care. Habits established during this period may lower the risk of adherence problems and metabolic crisis during the adolescent years and may improve long-term adherence and health outcomes through the life-span.

However, little is known about factors related to adherence or glycemic control problems in preadolescent or younger children. The few studies that have included younger children (Hauser et al., 1990; Jacobson et al., 1994; Miller-Johnson et al., 1994) suggest that family functioning is linked to regimen
adherence and glycemic control in preadolescent and younger children with diabetes. In these studies, family conflict has been associated with poorer adherence and glycemic control, and family cohesion and organization have been associated with better adherence and glycemic control. More evidence links family variables with adherence and glycemic control among adolescents with diabetes (e.g., Hauser et al., 1990; Jacobson et al., 1994; Miller-Johnson et al., 1994).

The diabetes regimen is too complex and demanding for a young child to execute adequately without consistent support and assistance from parents or other adults. Preadolescents who assume greater responsibility for diabetes care are generally in poorer glycemic control than their peers who have more parental support for diabetes responsibilities (La Greca, Follansbee, & Skyler, 1990). Because preschool and elementary school children with diabetes depend so much more on their families than adolescents, parenting style may be a more specific predictor of diabetes outcome in this population than other indices of family functioning, such as cohesion and conflict, which have been studied predominantly in adolescents. The focus of this study was on parenting styles as they relate to adherence and glycemic control in preschool and elementary school children with diabetes, before parents shift responsibility for diabetes care to the child, typically at around 12 years of age (La Greca et al., 1990).

Warmth and control are two well-studied aspects of parental behavior in the child development literature and may be pertinent for children with diabetes. Greater parental warmth (support and affection) has been associated with better outcomes in broad areas of children's social competence, but parental coercion (i.e., control characterized by punitiveness and power assertion) has been associated with poorer social competence in children (e.g., Rollins & Thomas, 1979). Authoritative parenting, characterized by warmth and inductive control (i.e., control characterized by firmness, maturity demands, explanations, and flexibility), has been associated with positive outcomes in child development across different gender, ethnic, and socioeconomic backgrounds (Lamborn, Mounts, Steinberg, & Dornbusch, 1991; Rollins & Thomas, 1979; Slater & Power, 1987). We expected that characteristics of authoritative parenting, such as high levels of warmth and low levels of coercive control (i.e., strictness), would be associated with better adherence and glycemic control in children with diabetes.

Ethnicity has also been related to parenting; Black parents have been found to be more strict and parent-centered than White parents, possibly due to socioeconomic factors such as the quality of the family's neighborhood (Kelley, Power, & Wimbush, 1992). Race and socioeconomic status (SES) have been related to adherence and glycemic control in children and adolescents with diabetes: Blacks have poorer adherence and glycemic control than Whites (Auslander, Thompson, Dritzer, White, & Santiago, 1997; Delamater, Albrecht, Postellon, & Gutai, 1991; Delamater et al., 1999).

The purpose of this study was to examine the relationships among parenting style, regimen adherence, and glycemic control for preschool and elementary school children who have diabetes, taking demographic factors into consideration. We predicted that greater parental warmth and less strictness would be associated with better adherence and better glycemic control among these children.

**Method**

**Participants**

Fifty-five preschool and elementary school children (age: 4–10 years) with Type I diabetes mellitus, and the parent or guardian who accompanied them to a medical appointment (84% mothers), participated in the study. The children were free of other major diagnoses (e.g., mental retardation or another chronic disease). Girls constituted 56% of the sample. Fifty-eight percent of the sample were White non-Hispanic, 16% were Black, and 26% were Hispanic. The sample was predominantly (49%) upper-middle class (Class IV, Hollingshead, 1975), with a wide range of SES scores. Approximately a third (36%) of the sample lived in single-parent families. Four subjects reported hospitalization for diabetic ketoacidosis (DKA) within the past year, excluding diagnosis. About a fourth (27%) of the sample had been diagnosed within the past year. Participants were recruited at two diabetes clinics associated with a university medical center and two physician's offices. The university-based clinics primarily served families whose children qualified for publicly funded health insurance. Data
from these sites were combined to achieve a larger, more representative sample.

**Procedure**

The parent who accompanied the child with diabetes on a medical visit was asked to participate in a study of parenting and diabetes. After written informed consent (approved by the institutional review board) was obtained, the parent completed the study measures; of 78 families approached, 4 refused to participate, and 56 completed the study measures. Eighteen families agreed to participate but were not included in the study because they left the clinic before completing the measures. One child was excluded from analyses due to East Indian ethnicity. Demographic data were collected by interview of the parent, and SES was calculated (Hollingshead, 1975). The child’s age, date of diabetes diagnosis, number of hospitalizations for DKA in the past year, and most recent glycosylated hemoglobin (GHb) were collected by chart review. Six children lacked current GHb results.

**Measures**

*Parenting Style.* The Parenting Dimensions Inventory (PDI), a self-report measure of parenting style (Power, 1993; Slater & Power, 1987), is composed of 47 items that assess eight parenting dimensions. From these eight scales are derived two scales based on second-order factors: warmth and strictness. The PDI’s reliability and validity is supported by factor analysis and cross-validation (Kelley et al., 1992; Power, 1993; Slater & Power, 1987). Reliability in this sample was calculated for warmth (a = .80 vs. a = .76). In a sample of 10- to 17-year-old youths (N = 103; A. Delamater, personal communication, 1997), parent report on the SCI yielded good internal consistency (a = .84) and test-retest reliability over 2-4 weeks (r = .77, n = 32). The SCI’s validity is supported by comparison with the 24-hour recall interview (Greco et al., 1990).

*Glycemic Control.* The GHb assay, which reflects mean blood glucose concentration over the previous 2 months (Blanc, Barnett, Gleason, Dunn, & Soeldner, 1981), was used as the measure of glycemic control. GHb values were transformed into z scores based on the normal ranges reported by each laboratory (M ± SD) to make the results from different laboratories comparable (GHb z score = [GHb % − lab M]/lab SD). Due to residual insulin secretion in the period following diagnosis, 11 newly diagnosed (less than 1 year) children were excluded from GHb analyses. The mean GHb z score values including these children (n = 49) were M ± SD = 6.3 ± 3.1. Raw GHb scores, including newly diagnosed children, were M ± SD = 8.7 ± 1.5%.

**Results**

**Clinical Characteristics**

Correlations, means, and standard deviations are presented in Table I. Mean adherence scores were above 4, indicating good regimen adherence overall. However, a significant percentage of the sample reported difficulty adhering to the regimen, reflected in adherence ratings less than 4 for overall adherence (16%). The mean raw GHb score for the sample was 8.7%, indicating fair to good glycemic control among these children. However, 43% of the sample had GHb values more than 4 SDs above the normal range, indicating fair to poor glycemic control, and 18% were in poor control, over 6 SDs
with better adherence ratings, and restrictiveness was associated with poorer glycemic control and lower SES. However, the hypotheses of restrictiveness linked with poor adherence and warmth with better glycemic control were not supported (see Table I). Physical punishment was inversely related to warmth and positively with restrictiveness. Glycemic control (GHB z score) was not related to disease duration when including only those children who had been diagnosed at least a year prior. The correlation between GHB z score and duration was r = .26 (p < .10, n = 49) in the full sample.

**Predicting Adherence**

We used hierarchical regression to test the hypothesis that parenting variables predict adherence ratings, while controlling demographic variables. Variables entered in each step were retained only if the test of the predictor was significant at p < .001. Adjusted variance, equivalent to the test of the model, was not significant (R^2 = R^2A = .0001, p > .90, n = 50), and SES was not retained. In the third step, parenting variables (warmth, amount of control, restrictiveness, physical punishment) were entered, improving the model significantly (R^2 = R^2A = .33, p < .001, adjusted R^2 = .28, n = 52). Warmth was the only significant predictor, which uniquely ex-

### Table I. Correlations (Pearson r) and Means (SD)

<table>
<thead>
<tr>
<th></th>
<th>Warmth</th>
<th>Restrictiveness</th>
<th>Amount of control</th>
<th>Physical punishment</th>
<th>Adherence</th>
<th>GHB z score*</th>
<th>M (SD)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>−.02</td>
<td>−.06</td>
<td>.04</td>
<td>−.07</td>
<td>−.21</td>
<td>.07</td>
<td>7.5 (1.9)</td>
<td>55</td>
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<tr>
<td>Duration (yrs)</td>
<td>.12</td>
<td>−.19</td>
<td>.09</td>
<td>.03</td>
<td>.19</td>
<td>.01</td>
<td>2.7 (2.0)</td>
<td>55</td>
</tr>
<tr>
<td>SES</td>
<td>−.07</td>
<td>−.54***</td>
<td>.03</td>
<td>.13</td>
<td>.05</td>
<td>−.28*</td>
<td>38 (13)</td>
<td>53</td>
</tr>
<tr>
<td>Warmth</td>
<td></td>
<td>−.13</td>
<td>.08</td>
<td>−.30**</td>
<td>.56***</td>
<td>−.05</td>
<td>0 (1)</td>
<td>53</td>
</tr>
<tr>
<td>Restrictiveness</td>
<td></td>
<td></td>
<td>.25*</td>
<td>−.01</td>
<td>.36**</td>
<td>0 (1)</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>Amount of control</td>
<td></td>
<td></td>
<td>−.08</td>
<td>.13</td>
<td>.11</td>
<td>0 (1)</td>
<td>53</td>
<td></td>
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<tr>
<td>Physical punishment</td>
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<td></td>
<td>−.17</td>
<td>.17</td>
<td></td>
<td>0 (1)</td>
<td>53</td>
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<tr>
<td>Adherence</td>
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<td>−.20</td>
<td></td>
<td>4.4 (0.6)</td>
<td>55</td>
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<tr>
<td>GHB z score*</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>7.0 (3.1)</td>
<td>38</td>
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</tr>
</tbody>
</table>

*Standard scores relative to distribution in nondiabetic population; excludes subjects with duration <12 months (n = 11).
* * *p < .001.
* * *p < .05.
explained 27% of the variability in adherence ratings ($b_{\text{warmth}} = .32, p < .001$).

**Predicting Glycemic Control**

We used hierarchical regression to test the hypothesis that parenting variables predict glycemic control, while controlling demographic variables. Variables were retained if the test of the predictor was significant at $\alpha = .10$. Age, gender, and ethnicity were entered in the first step. Black ethnicity was retained ($R^2 = .25, p = .05; n = 36$ at each step; $b_{\text{black}} = 4.2, p < .01$). The reduced model significantly predicted GHb z score ($R^2 = .23, p < .01$, adjusted $R^2 = .21$). SES was entered in the second step; it did not improve the model or mediate the ethnicity effect ($R^2 \Delta = .001, p > .10$; $b_{\text{black}} = 3.9, p < .01$) and was not retained. Adherence ratings were entered in the third step but failed to improve the model ($R^2 \Delta = .01, p > .30$) and were not retained. Finally, parenting variables were entered but did not improve the model ($R^2 \Delta = .03, p > .10$).

**Discussion**

Few behavioral diabetes studies have been published for the preschool through elementary school age group, perhaps due to the higher prevalence of diabetes and worse glycemic control among adolescents (Delamater et al., 1991; La Greca et al., 1990). Nevertheless, it is critical to examine young children with diabetes because of their profound dependence on their parents, the self-control skills mastered in middle childhood, and the self-care habits established during this time. In this study, parenting style was related to diabetes regimen adherence. Specifically, more parental warmth is associated with better adherence among preschool through school age children, explaining about a quarter (27%) of the variance in adherence ratings. This is concordant with the child development literature, linking parental warmth with good behavior and positive developmental outcomes (Rollins & Thomas, 1979). It also fits in with the diabetes-specific family support literature on adolescents and extends it specifically to younger children; cohesion is associated with better adherence and conflict with poorer adherence (e.g., Hauser et al., 1990; Miller-Johnson et al., 1994). However, conclusions must be tempered by caution, since social desirability bias may influence parent report of both warmth and adherence. Thus, further study is needed of these constructs.

Greater parental warmth may improve adherence through a reduction in family conflict, an increase in cohesion, or both. Another possible mechanism for the effect of parental warmth on adherence is through the child's development of self-control. The child's ability to delay gratification and his or her sense of self-efficacy (and its converse, learned helplessness) are developing during this period (Diener & Dweck, 1980; Mischel, Shoda, & Rodriguez, 1989). Rollins and Thomas (1979) linked parental warmth with greater self-esteem and internal locus of control. Learned helplessness has been linked with worse glycemic control (Kuttner, Delamater, & Santiago, 1990) and self-efficacy with better glycemic control in adolescents with diabetes (Grossman, Brink, & Hauser, 1987).

Parental restrictiveness was associated with worse glycemic control, lower SES, and Black ethnicity in this sample. However, neither SES nor parenting variables predicted glycemic control when Black ethnicity was a predictor. Confounding made it impossible to sort out the effects of demographics and restrictiveness. Restrictiveness could add to previous findings linking more generalized family conflict to poorer glycemic control in children and adolescents with diabetes (e.g., Miller-Johnson et al., 1994). A restrictive parenting style may be a response to behavioral problems, a threatening environment, or other stressors on the family system. Strictness may also be a source of stress for the child. Thus, an association between restrictiveness and glycemic control could reflect an array of relationships between psychosocial stress and glycemic control. Extreme restrictiveness may contribute to poorer glycemic control, even in Black families where strictness is the norm, despite other potential advantages of strictness, such as safety (Kelley et al., 1992). Studies with larger, multiethnic samples are needed to explore the potentially important relationships of restrictiveness to demographic characteristics and glycemic control.

The findings of this study indicate that, although many young children with diabetes adhere well to the diabetes regimen and have adequate glycemic control, there are a significant number of children with regimen adherence problems and poor glycemic control. This contradicts the belief that children have no problems with diabetes until
the onset of puberty. These children may benefit from interventions to improve their health care behaviors and glycemic control, thus affecting their long-term health.

The unique contribution of this study is the finding that parenting styles are associated with adherence in an understudied group, young children with diabetes. These findings suggest that parent training interventions might have beneficial effects on children’s health behaviors and outcomes. Prospective, randomized intervention studies are needed to test interventions that encourage authoritative parenting, characterized by support and affection, using inductive rather than coercive control techniques. Interventions provided during this period may have lasting effects that could ameliorate the expected worsening of adherence and glycemic control during adolescence and potentially avert or delay the development of complications.

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