

# The Role of Parent–Adolescent Attachment in the Glycemic Control of Adolescents With Type 1 Diabetes: A Pilot Study

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*This pilot study explored the associations between parent and adolescent reports of adolescent attachment and glycemic control in adolescents with Type 1 diabetes. We hypothesized that more secure attachment would correlate with more optimal diabetes control. Thirty-one families completed written self-report questionnaires about adolescent attachment, demographic data, and diabetes control. Adolescents and parents reported on their perceptions of adolescents' attachment to mothers and fathers. Mean HbA1c for the sample was 7.6% (SD = 1.14). Mothers' perceptions of adolescents' attachment were significantly correlated with adolescents' hemoglobin A1c ( $r = -.42, p = .022$ ), indicating that maternal perceptions of more secure attachment was associated with better glycemic control. Neither fathers' perceptions nor adolescents' reports of attachment was significantly correlated with glycemic control. Attachment appears to be associated with glycemic control in this population though*

*the mechanisms are unclear. Mothers' perceptions of attachment had the strongest associations with control, not adolescent reports. Further research is needed to understand the mechanisms through which parent reports of adolescent attachment are associated with glycemic control.*

**Keywords:** diabetes, adolescent, parent attachment, relationship quality

**T**his study seeks to examine the relationship between attachment and glycemic control in a sample of adolescents with Type 1 diabetes mellitus. Research suggests that adolescents with Type 1 diabetes may be especially vulnerable to difficulties maintaining their blood glucose levels. Adherence to treatment regimens for diabetes mellitus declines as children age (Jacobson et al., 1990; Johnson et al., 1988), and overall control worsens during adolescence (Bryden et al., 2001; Dabadghao, Vidmar, & Cameron, 2001; Mortenson et al., 1998). Daneman, Wolfson, Becker, and Drash (1981) reported that adolescents with insulin-dependent diabetes mellitus were in poorer control than either younger children or young adults, suggesting that there are challenges to control that may be specific to adolescence. Although some have suggested that the onset of puberty induces a

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greater resistance to insulin and consequently poorer control, others have argued that the effects of psychosocial and cognitive development during adolescence may have a more substantial role to play in difficulties with glycemic control (Ingersoll, Orr, Vance, & Golden, 1992).

### **FAMILY CHARACTERISTICS THAT IMPACT DIABETES OUTCOMES**

The normative developmental shifts and evolutions for children and their families have a significant impact on adolescents' diabetes health and vice versa (Delamater et al., 2001). Individual development and family configurations, dynamics, relationships, and stresses all have important implications for diabetes management among adolescents.

Research on Type 1 diabetes in childhood and adolescence has been consistent in linking glycemic control and medical treatment adherence to family variables (e.g., Anderson & Auslander, 1980; Johnson, 1988; La Greca, 1988; Wysocki et al., 2007). Family factors that have been shown to contribute positively include low levels of conflict and stress (Miller-Johnson et al., 1994; Schafer, Glasgow, McCaul, & Dreher, 1983); high levels of cohesion, organization, and support (Finney & Bonner, 1992; Skinner & Hampson, 1998); strong communication and problem-solving skills (Kovacs, Goldston, Obrosky, & Iyengar, 1992; Wysocki, Harris, Greco, & Bubb, 2000), parental collaboration in management (Wiebe et al., 2005), and appropriate amounts of involvement, and disease-specific monitoring among parents and children (Delamater et al., 2001; Ellis et al., 2007).

Although these factors certainly represent a range of critical family dynamics, they stop short of capturing the cognitive and affective qualities of the parent-adolescent relationship described through the lens of attachment, which may be a critical factor in diabetes control and self management across the life span, and one

that few studies have explored. Attachment theory is built on the premise that dependency is a natural and necessary part of human life, particularly during early childhood, but also throughout the lifecycle (Bowlby, 1969, 1982). *Positive and secure attachments* are defined as those relationships that are characterized by constant and consistent support, responsiveness and flexibility, and emotional accessibility. Internal working models based on early attachment experiences are, for the most part, stable over time, and represent the link between attachment in infancy and attachment relationships across developmental stages. Notwithstanding their roots in the earliest relationships, they are open to revision as needed to maintain their usefulness and adaptability (Bowlby, 1969, 1982; Scharfe, 2003).

### **ATTACHMENT AND HEALTH**

Bowlby (1969) hypothesized that illness as a "strange situation" activates attachment behaviors. This study also seeks to delineate how attachment relationships may impact illness or health behaviors, such as diabetes management. Given the vast amount of research associating parent-adolescent attachment and psychosocial outcomes (e.g., Allen & Land, 1999; Allen, Moore, Kuperminc, & Bell, 1998; Armsden & Greenberg, 1987; Papini & Roggman, 1992), it is surprising that few studies to date have explored its relationship with health outcomes in adolescents. Attachment security is correlated with general coping skills (e.g., LaRose & Bernier, 2001), supportive relationships with others (e.g., Allen & Land, 1999; Kenny, 1987; Rice, 1990), and effective problem solving (e.g., Cobb, 1996), all factors that optimize the ways in which individuals promote health for themselves and cope with problems as they arise. Kuncze and Shaver (1994) argued that internal representations of self as worthy of care, love, and responsiveness from others may be associated with an individual's willingness to

care for him- or herself around health issues as well as to expect care and consideration from others. In contrast, insecure attachment and negative internal representations and views of self may guide individuals to lead unhealthy lives and not to care for themselves as well.

Empirical research has suggested that insecure attachment is linked with more frequent symptoms of pain and poor health (Feeney, 2000). Kotler, Buzwell, Romeo, and Bowland (1994) and Hazan and Shaver (1987, 1990) suggested that insecure attachment is not only linked with anxiety but also with psychosomatic illness and physical complaints in both adolescents and adults. Several studies also have found that some styles of insecure attachment are associated with poorer glycemic control (Ciechanowski, Hirsch, & Katon, 2002; Ciechanowski, Russo, Katon, & Walker, 2001) and poorer adherence to blood glucose testing and injections (Turan, Osar, Turan, Ilkova, & Damci, 2003). Ciechanowski and colleagues (Ciechanowski et al., 2002; Ciechanowski, Katon, & Walker, 2001; Ciechanowski et al., 2004) found that adults with dismissing attachment styles are at greater risk for noncompliance and poorer diabetes control as compared with those with preoccupied attachment styles. These findings have not yet been replicated in adolescent study groups. Despite the evidence suggesting the reciprocal impact of illness and family relationships, no research to date has explored illness and attachment as a family level, interactional process in a study involving multiple respondents.

### **PURPOSE OF THE PRESENT STUDY**

Although the extant literature has facilitated a better understanding of adolescence, insulin-dependent diabetes, attachment, and family variables, its ability to explain poor glycemic control in adolescents with Type 1 diabetes is still lacking. Given the critical nature of early attachment as it relates to later self-care and

health behaviors, this research explored the extent to which attachment impacts health behaviors in adolescence. More specifically, the present study sought to explore how parent-adolescent attachment relationships relate to glycemic control in adolescents with Type 1 diabetes. We hypothesized that more secure attachment will correlate with more optimal control.

## **METHOD**

### **Sample**

We recruited 31 families of adolescents between the ages of 12 to 18 who had Type 1 diabetes for participation in this study. Eligibility criteria included diagnosis of diabetes for at least 1 year, one parent present in the home, and English language skills sufficient for completion of the study materials. Participants self-selected for involvement in the study through either a solicitation in a newsletter of a local diabetes support organization or advertisements posted in a hospital-based pediatric endocrinology treatment center. Study materials were mailed to parents and adolescents meeting eligibility criteria and consenting/assenting to participation, and families were offered \$10 total for completion of the study. Parents and adolescents were instructed to complete study materials independently.

### **Procedure**

Participants (parents and adolescents) completed a set of written questionnaires including information about themselves and their families (demographic), adolescent diabetes control, and their perceptions of the quality of their family relationships as measured by the Inventory of Parental and Peer Attachment (IPPA; Armsden & Greenberg, 1987). The questionnaires were assigned an identification number on distribution to ensure the confidentiality of participant's families. Thus study was approved by the Institutional Review Boards for both the hospital that operates the

treatment facility as well as the university with which the first author was affiliated.

## Measures

### Demographic and Diabetes Information

Parents and adolescents each completed their own demographic questionnaires, including questions about each participant's age, gender, racial and ethnic identity, and family income. The demographic questionnaire also inquired about the adolescent's diabetes (type of insulin therapy, age at onset, prevalence of diabetes within the family, most recent hemoglobin A1c (HbA1c<sup>1</sup>). Parents and adolescents both reported on hemoglobin A1c; maternal, paternal, and adolescent responses to this item were nearly identical ( $R = .99$ ;  $p < .001$ ).

### Parent-Adolescent Attachment

Adolescents assessed the quality of parent-adolescent attachment with the IPPA (Armsden & Greenberg, 1987). The IPPA was designed to measure internal working models of attachment based on Bowlby's thesis that the internalized working models are more or less stable and affect individuals' well-being across time and situations (Bowlby, 1969, 1982). Participants responded only to the 28-item parent-adolescent attachment measure, not the peer attachment measure because parent-adolescent relations were the focus of this study. Items from the IPPA are designed to assess trust, communication, and alienation using a 5-point Likert scale format from 1 (*almost never or never*) to 5 (*almost always or always*). Although each factor represents a subscale, analyses are based on summed totals, rather than scores of each subscale (Armsden & Greenberg, 1987), with higher total scores indicating more secure attachment. The IPPA includes questions such as "My parents respect my feelings," "I tell my parents about my problems and troubles," and "My parents don't understand what I'm going

through these days." The adolescents responded separately about their relationships with mothers and fathers. Higher scores on the IPPA indicate more secure attachment. Armsden and Greenberg (1987) reported Cronbach's alpha values of .87 for mother attachment and .89 for father attachment. The present study found alpha values of .94 for mother attachment and .95 for father attachment in this sample.

To assess parents' perspectives on adolescent attachment, parents responded about their own perceptions of how their adolescents gauge attachment to them. We modified each question from the adolescent version of the IPPA to reflect the parent's belief about their adolescent (i.e., "My adolescent feels I respect his feelings," "My adolescent feels I don't understand what he's going through these days"). Psychometric properties for the modified parent versions were strong, yielding a Cronbach's alpha of .85 for the mother's version and .86 for the father's version.

## RESULTS

### Study Participants

The adolescent sample was 58% male with a mean age of 15.33 years ( $SD = 1.76$ ) and a mean age of diagnosis with Type 1 diabetes mellitus at 9.4 years ( $SD = 3.65$ ). Adolescent age was normally distributed. The mean age of fathers ( $N = 22$ ) was 47 years ( $SD = 4.77$ ) and 45 years ( $SD = 5.34$ ) for mothers ( $N = 31$ ). Ninety-three percent of the families were White. Fifty-seven percent of families reported an annual income of \$69,000 or less, and the sample was pre-

<sup>1</sup> This blood test is a measurement of the concentration of glucose in the blood over the eight to twelve weeks prior. Higher HbA1c percentages reveal higher concentrations of blood glucose during that time, an indicator of suboptimally controlled blood glucose levels. This evaluation is the most common indicator used in diabetes care to measure the combined effect of diet, exercise, and insulin therapy on blood glucose control in patients with diabetes. A 1% change in HbA1c corresponds to a 30 mg/dL change in mean blood glucose level (Goldstein & Little, 1999).

dominantly comprised of two-parent, intact families. The mean HbA1c for the sample was 7.6% ( $SD = 1.14$ ), indicating that the sample is in overall good control of diabetes; normal HbA1c values for individuals without diabetes typically fall below 6%, and optimal values for patients with diabetes typically fall below 7%. Nearly 28% of adolescents had HbA1c results higher than 8%.

### Descriptive Statistics

Adolescents reported an average mother-attachment score of 103.09 ( $SD = 20.58$ ) on the IPPA, which had a potential range of 28 to 140. Adolescents reported an average father-attachment score of 96.72 ( $SD = 23.58$ ). The difference between adolescent reports of mother and father attachment was significant,  $t(30) = 2.43$ ,  $p < .05$ , suggesting that adolescents reported more secure attachment to mothers than to fathers.

Mothers reported a mean perceived attachment score of 99.66 ( $SD = 11.28$ ) and fathers reported a mean of 99.23 ( $SD = 11.54$ ). Table 1 shows that mothers' and fathers' perceptions were significantly correlated with each other ( $r = .54$ ,  $p \leq .01$ ). Mother reports were also significantly correlated with adolescent reports of mother attachment ( $r = .70$ ,  $p \leq .001$ ). Father reports were not significantly correlated with adolescent reports ( $r = .25$ ,  $p = .26$ ). Consistent with the existing literature, there was no significant difference in attachment scores between males and females, and the adolescents rated their attachment with mothers higher than with fathers (mean difference = 6.56),  $t(30) = 2.43$ ,  $p < .05$ . No significant differences existed between mother and father perceptions of their adolescent's attachment (mean difference = 1.30),  $t(30) = .60$ ,  $p = .55$  (see Table 2).

Table 1  
Multiple Regressions on HbA1c

Variable	$\beta$	95% CI	$R^2$	$\Delta R^2$
Mother's age	-.06	-.14, -.02		
Male	.45	-.43, 1.33	.15	
Adding adolescent-mother attachment				
Mother's age	-.07	-.16, 0.00		
Male	.46	-.37, 1.30		
Adolescent-mom attachment	-.02	-.04, 0.00 <sup>†</sup>	.27	.12
Adding adolescent-father attachment				
Mother's age	-.10	-.20, 0.00		
Male	.18	-.37, 1.15		
Adolescent-dad attachment	-.01	-.04, 0.01*	.25	.10
Adding mother attachment to adolescent				
Mother's age	-.08	-.16, -.01		
Male	.27	-.43, 1.07		
Mom-adolescent attachment	-.05	-.08, -.01*	.37	.22
Adding father attachment to adolescent				
Mother's age	-.09	-.20, -.03		
Male	.65	-.45, 1.76		
Dad-adolescent attachment	-.04	-.09, 0.00*	.40	.25
Adding adolescent-parent and parent-adolescent attachment				
Mother's age	-.08	-.16, -.01		
Male	.36	-.37, 1.16*		
Adolescent-parent	-.003	-.03, 0.02		
Parent-adolescent	-.05	-.09, 0.00*	.24	.09

Note. HbA1C = hemoglobin A1c (3m blood test of overall glucose control).

<sup>†</sup>  $p < .10$ . \*  $p < .05$ .

Table 2  
Study Variables

Variable	<i>M</i>	<i>SD</i>	95% CI	
			Lower	Upper
HbA1c	7.63	1.14	7.19	8.06
Adolescent–dad attachment report	96.72	23.58	87.57	105.86
Adolescent–mom attachment report	103.09	20.58	95.26	110.92
Mom–adolescent attachment report	99.66	1.28	95.37	103.95
Dad–adolescent attachment report	99.23	11.54	94.11	104.35

Note. CI = confidence interval; HbA1C = hemoglobin A1c (3m blood test of overall glucose control).

### Hypothesis Testing

#### Hypothesis 1: More Secure Attachment Will Be Associated With Lower HbA1c Scores

Mothers' perceptions of adolescent attachment were negatively correlated with the adolescents' latest hemoglobin A1c ( $r = -.42, p < .05$ ), indicating that less secure attachment was associated with poorer glycemic control. Neither fathers' perceptions nor adolescents' reports of attachment to either parent was significantly correlated with glycemic control, though fathers' perceptions of adolescent attachment were marginally significant ( $r = -.40, p < .10$ ). Adolescent reports of attachment to mothers were not significant ( $r = -.26, p = .13$ ; see Table 3).

Given the size of the correlations between maternal age and adolescent gender, and HbA1c, both demographic variables were used as covariates in regression mod-

els. Multiple-regression analyses confirmed that mothers' perceptions of adolescents' attachment were still highly associated with HbA1c ( $p < .01, \Delta R^2 = .22$ ) after controlling for mother's age and adolescent gender. Although the bivariate correlation was only marginally correlated, fathers' perceptions of adolescent attachment were significantly associated with HbA1c in a comparable regression model ( $p < .05, \Delta R^2 = .25$ ). Adolescent reports of attachment to their mothers remained marginally correlated ( $p = .05, \Delta R^2 = .12$ ). Adolescent reports of attachment to their fathers were still not significantly associated with HbA1c ( $p = .16$ ; see Table 1).

### DISCUSSION

#### Association Between Attachment and HbA1c

Maternal perceptions of their adolescents' attachment correlated significantly

Table 3  
Correlations of Study Variables With Diabetes Control

Variable	1	2	3	4	5	6	7	8
1. HbA1C	—							
2. Adolescent–dad attachment report	-.16	—						
3. Adolescent–mom attachment report	-.26	.81**	—					
4. Mom–adolescent attachment report	-.42*	.69**	.70**	—				
5. Dad–adolescent attachment report	-.40†	.25	.30	.54*	—			
6. Male	.26	-.06	.07	-.10	.02	—		
7. Adolescent age	.09	.09	.01	.07	-.33	-.06	—	
8. Mother age	-.34*	.26	-.22	-.19	.05	-.27	.23	—

Note. HbA1C = hemoglobin A1c (3m blood test of overall glucose control).

†  $p < .10$ . \*  $p < .05$ . \*\*  $p < .005$ .

with HbA1c, and paternal perceptions neared significance, even though adolescent reports did not. The association between mothers' views of their adolescents' attachment and HbA1c may be explained by several factors. First, it may be that adolescents whose mothers perceive that they are more securely attached are better equipped and more likely to work cooperatively and collaboratively with their caretakers to manage their diabetes. Waters, Kondo-Ikemura, Posada, and Richters (1991) suggested that children are more likely to cooperate with parent requests and monitoring when they have a series of experiences of their parents as a reliably responsive and available secure base. Kerns, Aspelmeier, Gentzler, and Grabill (2001) found that more secure attachment, as reported by both middle-school children and their parents, was associated with closer parental monitoring and greater cooperation among children during monitoring. This finding may extend to monitoring and negotiating the sharing or transfer of responsibility for diabetes care between adolescents and their parents. Considering the recent findings of Ellis and colleagues (2007), diabetes-specific monitoring and perceptions of parental support may be important factors in diabetes outcomes for adolescents.

More securely attached adolescents may also have a greater sense of self-efficacy in managing diabetes as a result of consistent and effective support being offered by, or otherwise experienced from, their parents. Parents' beliefs that their adolescents experience this level of support may have a comparable effect; when parents perceive that their adolescents feel securely attached, parents themselves may come closer to striking the balance between managing their adolescents' diabetes and allowing them to demonstrate leadership over it themselves.

### **Adolescent Versus Parental Reports of Attachment and Variance in HbA1c**

Adolescent reports of attachment to their parents were not found to be significantly associated with HbA1c, though the results neared statistical significance. The adolescent attachment literature consistently shows optimal outcomes for psychosocial development among more securely attached adolescents. Although the lack of significant association here is surprising, other studies have found that parental reports of attachment are better correlates of adolescent outcome than are adolescent reports. For example, Dornbusch, Erickson, Laird, and Wong (2001) in a longitudinal study using a national probability sample found that parental reports of attachment to their adolescent, compared with adolescent reports, more strongly predicted levels of deviant behavior. This study, however, explored parental reports of attachment, rather than parental perceptions of adolescent attachment, as in this study. Clark, Neighbors, Lesnick, Lynch, and Donovan (1998) found that, among adolescents with alcohol abuse problems, mothers reported less optimal family functioning than did the adolescents themselves. In addition, Krohn, Stern, Thornberry, and Jang (1992) found that parental perceptions of family processes explained more variance in delinquent behavior than did adolescent perceptions. These findings lend support to the idea that mothers' reports may be better indicators of negative behavioral and health outcomes in adolescents.

It may be that mothers assess relationship quality with their adolescents from a longer term perspective, whereas adolescents may be more focused developmentally on the moment-to-moment changes and interactions. It is possible that mothers have a better understanding of the future of their adolescent's health and as a result give more thought to the long-term consequences of diabetes than do adolescents, themselves.

The effect of parental reports notwithstanding, the lack of significant results connecting adolescent reports of attachment and glycemic control may be attributable to several factors. First, it may be that a significant association between adolescent attachment and glycemic control does exist, though perhaps the size of the sample limited its ability to provide the variance necessary to detect this association. A larger sample size with more variability in responses about security of attachment to each parent and a wider range of glycemic control may allow those correlations to emerge, and future studies may reveal this effect.

Second, it is possible that adolescent respondents in this study reported more positive perceptions than they actually experience, due to some concern that their parents may view their responses. Although we instructed families not to share their responses with each other, the adolescents may have felt that their responses would not remain private once they were completed. Researcher-facilitated administration of the questionnaires, as compared with mailing them, may avert this potential for bias in the future.

### **Implications for Clinical Practice**

This study revealed that maternal perceptions of adolescent attachment are associated with diabetes outcomes although adolescent reports of attachment in this sample were not significantly related. When mothers perceived that their adolescent felt more securely attached to them, these perceptions were associated with lower HbA1c, suggesting more optimal diabetes management. It may also be true that glycemic control shapes how parents perceive other relationship qualities; when HbA1c is lower, and the adolescent's diabetes health is in better control, parents may perceive a higher level of attachment in their adolescent or make additional positive attributions. If such an effect exists, however, it is unclear how much of it is accounted for

by lower parental stress and increased parental self-efficacy (Streisand, Swift, Wickmark, Chen, & Holmes, 2005). Although the literature on adolescence and diabetes may focus on increasing adolescent autonomy, responsibility, parental support and accountability while diminishing overreliance on parents, these findings suggest that an additional approach could be useful for this population. The strength of the association between maternal perceptions and health outcomes should encourage clinicians to support mothers' perceptions about their adolescents, more specifically about their feelings of being able to seek help as needed, to trust in their mothers, and to believe that they are valued and loved by their mothers. This is not to suggest that clinicians should ignore the experiences of adolescents in treatment. Effective family treatment is predicated on eliciting and valuing the stories and perceptions of each member, without discounting or devaluing one over another.

These results suggest that perhaps the effect of increasing the mothers' sense of security of attachment in their adolescent will be more efficacious than focusing on getting parents and adolescents to come to some level of agreement on the quality of their relationship, as some approaches might encourage. This perspective may deviate markedly from traditional approaches to adolescent health in which interventions focus more heavily on empowering adolescents, perhaps working with them individually, and underscoring their independence. Instead the findings here suggest, at minimum, including mothers in treatment and in establishing any clinical intervention.

### **Limitations and Future Directions**

This study has a number of strengths and limitations. First, this study contributes to existing literature validating the relationship between family variables and diabetes management in adolescents while adding the dimension of parent-adolescent



attachment, previously unexamined in this research. Second, it explored parent perceptions of adolescent attachment. A significant limitation of the extant literature on adolescents, attachment, and health outcomes has been the predominant use of a single-informant (adolescent only) designs; this study shows that parents may have a strong effect on adolescent outcomes. The approach taken in this study illustrates the importance of multiple perspectives among family members in cases in which relational dynamics are related to health outcomes. Although adolescent attachment scores only neared statistical significance, the size of the correlation warrants further consideration as an independent contributor to variance in HbA1c. Future studies with larger sample sizes should consider testing family level and interactional models of attachment in families with diabetes.

In addition, this study attempted to include fathers and father attachment despite the predominance within parent-child attachment research to utilize only mothers. Although it may be methodologically easier to select a "primary" attachment figure, in which case mothers may be the most likely choices, father-adolescent attachment in this study contributed uniquely to diabetes outcomes despite a small sample. This finding emphasizes the importance of including both parents in attempts to understand how attachment relationships may be related to these outcomes.

The most significant limitation is in sampling and distribution. The data were self-report, and participants self-selected for participation, both of which may skew the results. Collecting HbA1c data directly from the adolescents' medical records and comparing these assays across laboratories would have bolstered reliability of this variable. Future studies should include this method of data collection, especially around medical information that would be more reliably acquired through these as-

says. We also had a small sample size that limited possibilities for additional analysis. The relatively low mean HbA1c suggests that perhaps the present study may not have captured a broad enough cross section of adolescents with Type 1 diabetes during a time when research confirms that adolescence is the most challenging developmental stage for diabetes management.

Notwithstanding, the findings revealed significant relationships between parent-adolescent attachment and diabetes outcomes that are likely to only be strengthened, not muted, by a larger sample. Several studies have also noted the additional risk for diabetes management problems, noncompliance, and poor control among adolescents from low-income, minority, and single-parent families (Delamater et al., 2001; Ellis et al., 2005; Harris & Mertlich, 2003; Palta et al., 1997). Given that the vast majority of participant families in this study were White, two-parent, intact, and middle class, future studies should consider purposive oversampling of families across these variables to understand how they affect attachment processes and diabetes control.

This study also was limited by its use of single measures assessing each variable of interest. Using multiple-family functioning measures will clarify how attachment, specifically, impacts diabetes control differently than other family variables such as conflict and problem solving, which has been more thoroughly explored in existing research. An additional diabetes measure besides HbA1c, such as a behavioral checklist or compliance measure may also facilitate better understanding of the mechanisms behind how family level variables affect health behavior. Confirming HbA1c via blood sampling or medical records would have reduced potential for reporter bias, though recent literature has shown self-reported diabetes outcomes to be reasonably valid (Fowles, Rosheim, Fowler, Craft, & Arrichiello, 1999). Finally, utilizing an attachment measure that differen-

tiates among attachment styles, as in the work of Ciechanowski and colleagues (e.g., Ciechanowski, Hirsch, & Katon, 2002; Ciechanowski, Russo, Katon, Von Korff, Ludman, Lin, Simon, & Bush, 2004), may provide evidence for developing a more tailored intervention based on individualized needs according to the various attachment styles and how they relate with help seeking and coping with distress, such as illness. These distinctions may be useful in researching and working with adolescents, as well.

## REFERENCES

- Allen, J. P., & Land, D. (1999). Attachment in adolescence. In J. Cassidy & P. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 319–335). New York, NY: Guilford Press.
- Allen, J. P., Moore, C., Kuperminc, G., & Bell, K. (1998). Attachment and adolescent psychosocial functioning. *Child Development, 69*, 1406–1419.
- Anderson, B. J., & Auslander, W. F. (1980). Research on diabetes management and the family: A critique. *Diabetes Care, 3*, 696–702.
- Armsden, G. C., & Greenberg, M. T. (1987). The Inventory of Parent and Peer Attachment: Individual differences and their relationship to psychological well-being in adolescence. *Journal of Youth & Adolescence, 16*, 427–454.
- Bowlby, J. (1969). *Attachment and loss. Vol. 1: Attachment*. New York, NY: Basic Books.
- Bowlby, J. (1982). *Attachment*. New York, NY: Basic Books.
- Bryden, K. S., Peveler, R. C., Stein, A., Neil, A., Mayou, R., & Dunger, D. (2001). Clinical and psychological course of diabetes from adolescence to young adulthood. *Diabetes Care, 24*, 1536–1540.
- Ciechanowski, P., Hirsch, I., & Katon, W. (2002). Interpersonal predictors of HbA1c in patients with type 1 diabetes. *Diabetes Care, 25*, 731–736.
- Ciechanowski, P., Russo, J. E., Katon, W. E., & Walker, E. (2001). The patient-provider relationship: Attachment theory and adherence to treatment in diabetes. *American Journal of Psychiatry, 158*, 29–35.
- Ciechanowski, P., Russo, J., Katon, W., Von Korff, M., Ludman, E., Lin, E., . . . & Bush, T. (2004). Influence of patient attachment style on self-care and outcomes in diabetes. *Psychosomatic Medicine, 66*, 720–728.
- Clark, D. B., Neighbors, B. D., Lesnick, L., Lynch, K. G., & Donovan, J. E. (1998). Family functioning and adolescent alcohol use disorders. *Journal of Family Psychology, 12*, 81–92.
- Cobb, C. L. H. (1996). Adolescent-parent attachments family problem-solving styles. *Family Process, 35*, 57–82.
- Dabadghao, P., Vidmar, S., & Cameron, F. J. (2001). Deteriorating diabetic control through adolescence: Do the origins lie in childhood? *Diabetic Medicine, 18*, 889–894.
- Daneman, D., Wolfson, D. H., Becker, D. J., & Drash, A. L. (1981). Factors affecting glycosylated hemoglobin values in children with insulin-dependent diabetes. *Journal of Pediatrics, 99*, 847–853.
- Delamater, A. M., Jacobson, A. M., Anderson, B. J., Cox, D., Fisher, L., Lustman, P., . . . & Wysocki, T. (2001). Psychosocial therapies in diabetes: Report of the Psychosocial Therapists Working Group. *Diabetes Care, 24*, 1286–1292.
- Dornbusch, S., Erickson, K., Laird, J., & Wong, C. (2001). The relation of family and school attachment to adolescent deviance in diverse groups and communities. *Journal of Adolescent Research, 16*, 396–422.
- Ellis, D. A., Frey, M. A., Naar-King, S., Templin, T., Cunningham, P., & Cakan, N. (2005). Use of multisystemic therapy to improve regimen adherence among adolescents with type 1 diabetes in chronic poor metabolic control: A randomized controlled trial. *Diabetes Care, 28*, 1604–1610.
- Ellis, D. A., Podolski, C., Frey, M., Naar-King, S., Wang, B., & Moltz, K. (2007). The role of parental monitoring in adolescent health outcomes: Impact on regimen adherence in youth with type 1 diabetes. *Journal of Pediatric Psychology, 32*, 907–917.
- Feeney, J. A. (2000). Implications of attachment style for patterns of health and illness. *Child: Care, Health and Development, 26*, 277–288.
- Finney, J. W., & Bonner, M. J. (1992). The influence of behavioural family intervention on the health of chronically ill children. *Behaviour Change, 9*, 157–170.
- Fowles, J. B., Rosheim, K., Fowler, E. J., Craft, C., & Arrichiello, L. (1999). The validity of self-reported diabetes quality of care measures. *International Journal for Quality in Health Care, 11*, 407–412.
- Goldstein, D. E., & Little, R. R. (1999). Bringing order to chaos: Standardizing the hemoglo-

- bin A1c assay. *Contemporary Internal Medicine*, 9(5), 27–32.
- Harris, M. A., & Mertlich, D. (2003). Piloting home-based behavioral family systems therapy for adolescents with poorly controlled diabetes. *Children's Health Care*, 32, 65–79.
- Hazan, C. L., & Shaver, P. R. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology*, 52, 511–524.
- Hazan, C. L., & Shaver, P. R. (1990). Love and work: An attachment-theoretical perspective. *Journal of Personality and Social Psychology*, 59, 270–280.
- Ingersoll, G. M., Orr, D. P., Vance, M. D., & Golden, M. P. (1992). Cognitive maturity, stressful events, and metabolic control among diabetic adolescents. In E. J. Susman, L. V. Feagans, & W. J. Ray (Eds.), *Emotion, cognition, health, and development in children and adolescents* (121–132). Hillsdale, NJ: Erlbaum.
- Johnson, S. B. (1988). Diabetes mellitus in childhood. In D. K. Routh (Ed.), *Handbook of pediatric psychology* (pp. 9–31). New York, NY: Guilford Press.
- Kenny, M. E. (1987). The extent and function of parental attachment among first-year college students. *Journal of Youth and Adolescence*, 16, 17–27.
- Kerns, K. A., Aspelmeier, J. E., Gentzler, A. L., & Grabill, C. M. (2001). Parent-child attachment and monitoring in middle childhood. *Journal of Family Psychology*, 15, 69–81.
- Kotler, T., Buzwell, S., Romeo, Y., & Bowland, J. (1994). Avoidant attachment as a risk factor for health. *British Journal of Medical Psychology*, 67, 237–245.
- Kovacs, M., Goldston, D., Obrosky, D. S., & Iyengar, S. (1992). Prevalence and predictors of pervasive noncompliance with medical treatment among youths with insulin-dependent diabetes mellitus. *Journal of the American Academy of Child & Adolescent Psychiatry*, 31, 1112–1119.
- Krohn, M., Stern, S., Thornberry, T., & Jang, S. J. (1992). The measurement of family process variables: The effect of adolescent and parent perceptions of family life on delinquent behavior. *Journal of Quantitative Criminology*, 8, 287–315.
- Kunce, L. J., & Shaver, P. R. (1994). An attachment-theoretical approach to caregiving in romantic relationships. In K. Bartholomew & D. Perlman (Eds.), *Attachment processes in adulthood* (pp. 205–237). London, England: Kingsley.
- La Greca, A. M. (1988). Children with diabetes and their families: Coping and disease management. In T. Field, P. McCabe, & N. Schneiderman (Eds.), *Stress and coping across development* (pp. 139–159). Hillsdale, NJ: Erlbaum.
- LaRose, A., & Bernier, A. (2001). Social support processes: Mediators of attachment state of mind and adjustment in late adolescence. *Attachment & Human Development*, 3(1), 96–120.
- Miller-Johnson, S., Emery, R., Marvin, R., Clarke, W., Lovinger, R., & Martin, M. (1994). Parent-child relationships and the management of insulin-dependent diabetes mellitus. *Journal of Consulting and Clinical Psychology*, 62, 603–610.
- Mortenson, H. B., Robertson, K. J., Aanstoot, H. J., Danne, T., Holl, R. W., Hougaard, P., . . . & Aman, J. (1998). Insulin management and metabolic control of type 1 diabetes mellitus in childhood and adolescence in 18 countries: Hvidore Study Group on Childhood Diabetes. *Diabetic Medicine*, 15, 752–759.
- Palta, M., LeCaire, T., Daniel, K., Shen, G., Allen, C., & D'Alessio, D. (1997). Risk factors for hospitalization in a cohort with type 1 diabetes (Wisconsin Diabetes Registry). *American Journal of Epidemiology*, 146, 627–636.
- Papini, D. R., & Roggman, L. A. (1992). Adolescent perceived attachment to parents in relation to competence, depression, and anxiety: A longitudinal study. *Journal of Early Adolescence*, 12, 420–440.
- Rice, K. G. (1990). Attachment in adolescence: A narrative and meta-analytic review. *Journal of Youth and Adolescence*, 19, 511–538.
- Schafer, L. C., Glasgow, R. E., McCaul, K. D., & Dreher, M. (1983). Adherence to IDDM regimens: Relationship to psychosocial variables and metabolic control. *Diabetes Care*, 6, 493–498.
- Scharfe, E. (2003). Stability and change of attachment representations from cradle to grave. In S. M. Johnson & V. E. Whiffen (Eds.), *Attachment relationships in couple and family therapy* (pp. 64–84). New York, NY: Guilford Press.
- Skinner, T. C., & Hampson, S. E. (1998). Social support and personal models of diabetes in relation to self-care and well-being in adolescents with type 1 diabetes mellitus. *Journal of Adolescence*, 16, 305–329.
- Stein J. (1990). Adherence among children and adolescents with insulin-dependent diabetes mellitus over a four-year longitudinal follow-up: The

- influence of patient coping and adjustment. *Journal of Pediatric Psychology*, *15*, 511–526.
- Streisand, R., Swift, E., Wickmark, T., Chen, R., & Holmes, C. S. (2005). Pediatric parenting stress among parents of children with type 1 diabetes: The role of self-efficacy, responsibility, and fear. *Journal of Pediatric Psychology*, *30*, 513–521.
- Turan, B., Osar, Z., Turan, J. M., Ilkova, H., & Damci, T. (2003). Dismissing attachment and outcome in diabetes: The mediating role of coping. *Journal of Social and Clinical Psychology*, *22*, 607–626.
- Waters, E., Kondo-Ikemura, K., Posada, G., & Richters, J. (1991). Learning to love: Mechanisms and milestones. In M. Gunnar & L. A. Sroufe (Eds.), *Self processes and development. Minnesota symposium on child psychology* (Vol. 23, pp. 217–255). Hillsdale, NJ: Erlbaum.
- Wiebe, D. J., Berg, C. A., Korbel, C., Palmer, D. L., Beveridge, R. M., Upchurch, R., . . . & Donaldson, D. L. (2005). Children's appraisals of maternal involvement in coping with diabetes: Enhancing our understanding of adherence, metabolic control, and quality of life across adolescence. *Journal of Pediatric Psychology*, *30*, 167–178.
- Wysocki, T., Harris, M. A., Buckloh, L. M., Mertlich, D., Lochrie, A. S., Mauras, N., & White, N. H. (2007). Randomized trial of Behavioral Family Systems Therapy for diabetes: Maintenance of effects on diabetes outcomes in adolescents. *Diabetes Care*, *30*, 555–560.
- Wysocki, T., Harris, M. A., Greco, P., Bubb, J., Danda, C. E., Harvey, L. M., . . . & White, N. H. (2000). Randomized, controlled trial of behavior therapy for families of adolescents with insulin-dependent diabetes mellitus. *Journal of Pediatric Psychology*, *25*, 23–33.