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TYPE I DIABETES MELLITUS IN CHILDREN AND PRE-ADOLESCENTS: AFFECTIVE, BEHAVIORAL, AND SOCIAL CORRELATES

A Dissertation

Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Meredith P. Schwartzman

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DEDICATION

This dissertation is dedicated to my family. My parents, Alan and Rhoda, have always supported my curiosity and provided me with every opportunity to continue my education. My siblings, Andrew, Daniel, and Debra have also helped to support my educational endeavors by their praises and encouragements, but particularly by not teasing their youngest sister too much. To my husband, who through his determination and competitive spirit has shown me that any challenge can be reached. Lee, you have been my emotional coach and "sherpa" through this Iron-distance achievement. I thank you all for the love and support you gave in all my years, but most of all in the past five as I aimed high to receive my doctorate.

Not only have my family been supportive, but my friends and fellow lab/classmates also have been invaluable. Thank you all for your shared ideas and words of encouragement.

I also would like to dedicate this dissertation to all the other children and adults living with Type I Diabetes. Although we have a chronic illness, it does not define us. We are fighters and can achieve our dreams. Hopefully, more research will be conducted that will make living with diabetes more manageable until a cure is found.

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ABSTRACT

Type I diabetes mellitus (T1DM) is the most common metabolic disorder among children and adolescents (Wysocki, Greco, & Buckloh, 2003) and research has indicated that children with T1DM are more likely to develop clinical depression and anxiety relative to children without T1DM. Building on this literature, the present study utilized a multi-method assessment strategy of self- and parent-reported depression, anxiety, behavioral regulation (i.e. internalizing and externalizing behaviors), social competence, personality, and family dynamics to identify whether preadolescents with T1DM were distinguishable from children without T1DM, and also whether psychosocial differences were evident in the T1DM group as a function of treatment (i.e., insulin injection vs. insulin pump). The findings demonstrated that there were significant differences between the Diabetes and Non-Diabetes groups among parent-report measures of social deficits (i.e., CBCL Social Problems and Aggressive behaviors subscales, PIC-2 Dyscontrol subscale, and FES Independence subscale), cognitive difficulties (i.e., CBCL Thought Problems subscale and PIC-2 Cognitive Problems subscale), somatic complaints (ex. PIC-2 Somatic Complaints and Psychosomatic Preoccupations subscales), and mood problems (ex. PIC-2 Psychological Distress and Depression subscales). The data indicated differences between T1DM children in good versus poor metabolic control on a measure of personality (i.e. Withdrawal and Isolation subscales of the PIC-2). The findings also revealed differences between the insulin pump and insulin injection users among self

and parent-reported measures of mood difficulties and behavior problems (i.e., CDI Anhedonia subscale and PIC-2 Withdrawal and Isolation subscales).

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CHAPTER I

INTRODUCTION

Type I diabetes mellitus (T1DM) is the most common metabolic disorder among children and adolescents and affects approximately 1 in 500-600 children (Wysocki, Greco, & Buckloh, 2003; Travis, Brouhard, & Schreiner, 1987). Diabetes management includes intensive monitoring of blood glucose levels, insulin injections or insulin pump programming, as well as nutritional and exercise monitoring. Children and adolescents with T1DM are expected to take an active role in managing their disease and to limit the impact of the disease on psychosocial functioning (Blanz, Rensch-Riemann, & Schmidt, 1993). Indeed, responsibilities associated with the illness are considerable, and there are few other medical conditions that require children to be so active in self-monitoring and self-regulating their health care (Gonder-Frederick, Cox, & Ritterband, 2002).

Only within the past three decades have researchers begun to explore the psychological correlates of T1DM. Among the most concerning, children with T1DM are two to three times more likely to develop clinical depression relative to children without T1DM (Grey & Thurber, 1991; Grey, Whittemore, & Tamborlane, 2002; Kovacs, Iyengar, Goldston, Obrosky, & Bonar, 1997; Walker, Gortmaker, & Weitzman, 1981). Children with poor metabolic control appear particularly vulnerable to developing symptoms of depression and anxiety (Goldston, Kovacs, Obrosky, & Iyengar, 1995; Grey, Whittemore, & Tamborlane, 2002; Liss et al., 1998;

Mazze, Lucido, & Shamoon, 1984; Szydlo, van Wattum, & Woolston, 2003). The presence of hypo- or hyper-glycemia and the threat of severe complications can lead to related feelings of worthlessness, helplessness, and self-blame (Gonder-Frederick, Cox, & Ritterband, 2002). Conversely, the presence of mood and anxiety disorders may have serious implication for diabetes management. For example, T1DM patients with mood disorders are more likely to develop diabetic complications, decreased physical functioning, and poorer adherence to medical and dietary plans (Chisholm, 2003; Szydlo et al., 2003). Compared with healthy controls, diabetic children with psychological disorders also appear more likely to have increased school absences, low self-esteem, poorer quality of life, and more difficulties within family and peer relationships (Chisholm, 2003; Grey, Whittemore, & Tamborlane, 2002; Szydlo et al., 2003). Chisholm (2003) indicated that mothers' reported more school absences, poorer scholastic performance, poor medical adherence, and poor metabolic control in children with adjustment difficulties compared with well-adjusted children. Another study compared depressed children with non-depressed children (with T1DM), and significant differences between self-esteem, adaptation, and metabolic control were identified (Lernmark, Persson, Fishert, & Rydelius, 1999).

The prevalence of anxiety disorders in children with T1DM is unspecified (Meijer, Sinnema, Bijstra, Mellenbergh, & Wolters, 2000), however one study indicated that within the first 10-years after diagnosis, 13% of youths had an anxiety disorder (Kovacs et al., 1997). Anxiety also may be more prevalent in individuals with poor metabolic Non-Diabetes (Gonder-Frederick et al., 2002; Szydlo et al., 2003). In a somewhat equivocal body of literature, some researchers have found no

differences in anxiety symptoms between children newly diagnosed with T1DM compared to healthy peers (Grey et al., 1994), although others have reported that children with T1DM are more likely to develop anxiety problems than those without T1DM (Kovacs et al., 1997).

The social behavior of children and adolescents with T1DM also may be an important mediator in determining psychological adjustment, although research on peer relations and chronically ill children (including diabetes) is inconclusive. For example, several studies have revealed social deficits in T1DM children and adolescents relative to their peers (Alderfer, Wiebe, & Hartmann, 2001, 2002; Blanz, Rensch-Riemann, Fritz-Sigmund, & Schmidt, 1993; Holmes, Yu, & Frentz, 1999; Kovacs et al., 1985; Lavigne, Traisman, Marr, & Chasnoff, 1982). On the other hand, several studies show no evidence of social deficits or selective social problems in chronically ill relative to "normal" children (Mazze, Lucido, & Shamoon, 1984; Meijer et al., 2000; Spirito et al., 1991).

In addition to peer relationships, the attitudes, behaviors, and values of family members remain central to moderating the significance of daily stressors experienced by children with T1DM (Wertlieb, Hauser, & Jacobson, 1986). Indeed, family dynamics often are grossly altered when a child is diagnosed with a serious illness (Cerreto & Travis, 1984; Pendley et al., 2002). In the case of children with T1DM, as the family adapts to the physical and psychological demands of the child, the household environment may become more dysfunctional (Hanson , Henggeler, Burghen, & Moore 1989; Pendley et al., 2002), with increased parental surveillance and control (Evans & Hughes, 1987; Mullins et al., 2004) and more prominent

behavioral and affective problems exhibited by T1DM children (Mullins et al., 2004; Wertlieb, Hauser, & Jacobson, 1986). Constructive family interactions that foster a supportive environment (i.e., less conflict and more cohesion) are positively associated with better metabolic control, increased ability to manage daily stressors, and decreased depressive symptoms (Cohen, Lumley, Naar-King, Partridge, & Cakan, 2004; Davis et al., 2001; Grey, Davidson, Boland, & Tamborlane, 2001; Grey, Whittemore, & Tamborlane, 2002; Holmes, Yu, & Frentz, 1999; Hauser, Jacobson, Wertlieb, Brink, & Wentworth, 1985; Herskowitz et al., 1995). Conversely, increased social stress is associated with decreased metabolic control and depressive symptom patterns (Farrell, Hains, Hobart Davies, Smith, & Parton, 2004; Goldston et al., 1995; Liss et al., 1998; Mazze, Lucido, & Shamoon, 1984; Miller-Johnson et al., 1994).

Parenting style also may predict the psychosocial functioning of children with diabetes, although minimal research has addressed this question (Davis et al., 2001). In this particular study, authoritative parenting (parental firmness but flexibility, reasonable demands, freedom of opinion) was associated with more positive outcomes in child development, improved metabolic control, and better child compliance ratings by the parent. Restrictive parenting was associated with poorer social development and reduced metabolic control. This study was correlational in nature, however, and it may be that restrictive parenting may be a response to some other family dynamic, such as the extent of familial (or other environmental) stress, or potentially a consequence of pre-existing behavioral problems (Davis et al., 2001). It certainly is the case that independence is desired by most preadolescents, which

also includes independence insofar as health care behaviors are concerned (Davis et al., 2001). However, researchers have indicated that premature autonomy with respect to diabetes management can lead to negative clinical outcomes (Gonder-Frederick et al., 2002; Herskowitz et al., 1995; La Greca, Follansbee, & Skyler, 1990). Overextended parental involvement in medication management may also result in problems, however, with data suggesting that although heightened parental control may improve metabolic control, children's sense of autonomy and corresponding mood states may be negatively affected (Close, Davies, Price, & Goodyer, 1986; Eiser, 1990; Evans & Hughes, 1987).

It is conceivable that recent advances in diabetes treatment (i.e., the insulin pump) may help to diminish some of the negative consequences associated with T1DM. The insulin pump is an external medical device worn by patients 24 hours a day and provides a constant subcutaneous supply of insulin (Boland, Grey, Oesterle, Fredrickson, & Tamborlane, 1999). By increasing metabolic control, minimizing exercise restrictions, increased flexibility of meal times, and its covert location on the T1DM patient (Boland et al., 1999), children may be less apt to be stigmatized as different or abnormal, with potentially major implications on their social and psychological functioning. Mednick, Cogen, and Streisand (2004) indicated that children and their parents reported overall satisfaction with the insulin pump, improvement in diabetes management, and improved quality of life for the child. Research has been inconclusive about the relationship between quality of life and metabolic control, with several studies highlighting a positive association between QOL and metabolic control (Delameter, 2000; Rubin, 2000) and others finding no

association between QOL and metabolic control (Grey, Davidson, Boland, & Tamborlane, 2001; Worrall-Davies, Holland, Berg, & Goodyer, 1999).

In view of the limited and equivocal data exploring the relationships among affective, behavioral, and social correlates of children and adolescents with T1DM, the present study was designed to systematically assess psychosocial behaviors as they may differ between children with and without T1DM. Moreover, despite the potential psychosocial benefits of the insulin pump, only 15% of patients administering insulin via the pump are less than 20 years old (Boland et al., 1999). This statistic is surprising given that compared with adolescents using conventional injection methods, adolescents using the pump reported fewer difficulties in coping with diabetes (Boland et al., 1999). As the insulin pump has been a feasible treatment option for over a decade and research on the psychosocial benefits of this intervention among preadolescent children is lacking, the present study also assessed possible psychosocial differences as a function of treatment method.

By utilizing a multi-method strategy of self- and parent-reported depression, anxiety, behavioral regulation (i.e. internalizing and externalizing behaviors), personality, and family functioning, the primary objective was to identify whether children and preadolescents with T1DM were distinguishable from non-Diabetic peers. The present study also assessed if children in good metabolic control differed from children in poor metabolic control. Among the variables measured were self-reported depression (the Children's Depression Inventory; Kovacs, 1992) and anxiety (the Revised Children's Manifest Anxiety Scale; Reynolds & Richmond, 1985), as well as parental report of family functioning (the Family Environment Scale; Moos,

1981). Metabolic control was measured via the Hemoglobin A_1C, which was administered by the Diabetic children's physician. Not previously addressed in the literature, the present study also involved an examination of personality factors (the Personality Inventory for Children, second edition; Lachar, 1999) and parenting style (the Parental Authority Questionnaire; Buri, 1991) as a function of illness and treatment. Because quality of life among individuals with T1DM had not previously been tested, the authors modified a quality of life measure for use in the present study (the Diabetes Quality of Life for Youth; Ingersoll & Marrero, 1991). Also representing a methodological advancement over the existing literature, we utilized multiple raters (parent, and teacher) to assess internalizing and externalizing symptoms (i.e. the Child Behavioral Checklist and the Teachers' Report Form).

Based on the extant literature, hypotheses were as follows:

1) Parent and teacher reports of internalizing and externalizing behavioral problems would be significantly correlated as assessed via the CBCL and the TRF.
2) There will be significant positive associations among family cohesion, quality of life, authoritative parenting, and metabolic control and significant inverse relationships of these variables with depressive and anxiety symptoms.
3) Pre-adolescents with T1DM will have higher self-and parent-reported symptoms of depression, anxiety, and behavioral problems compared to age-matched peers without T1DM, (Aldefer et al., 2001, 2002; Chisholm,

2003; Grey, Whittmore, & Tamborlane, 2002; Grey et al., 1994; Kovacs et al., 1997; Meijer et al., 2000; and Szydlo et al., 2003).

4) Pre-adolescents with T1DM will exhibit increased personality and family problems relative to age-matched peers without diabetes.
5) Children in good metabolic control will have fewer self, parent, and teacher-reported symptoms of depression, anxiety, and behavioral problems, increased quality of life, and decreased personality and family problems relative to children in poorer metabolic control (Goldston et al., 1995; Grey, Whittemore, & Tamborlane, 2002; Liss et al., 1998; Mazze, Lucido, & Shamoon, 1984; Szydlo et al., 2003).
6) Children and adolescents using the insulin pump will have fewer self, parent, and teacher-reported symptoms of depression, anxiety, and behavioral problems.
7) Children using the insulin pump will report increased quality of life compared to children using insulin injections.
8) Pre-adolescents being treated with the insulin pump will exhibit decreased personality and family problems relative to those utilizing the traditional insulin injection method.

CHAPTER II

METHOD

Participants

Participants included 56 children between the ages of 7-13 (M = 9.4 yrs., SD = 1.8). Parents accompanied the child participants, and of the 56 parents, 53 were female and 3 were male. There were a total of 35 males and 21 females, and 92.9% of participants were Caucasian, 5.4% were African-American, and 1.8% classified themselves as other.

The Diabetes group consisted of 25 children, 16 males and 9 females between the ages of 7-13 (M = 9.8 yrs., SD = 1.8) who had been diagnosed with Type I diabetes for a minimum of 1 year (M = 4.7 yrs., SD =2.6), and 92% of participants were Caucasian and 8% were African-American. Seven parents reported that their children had other diagnosed physical or mental illnesses other than T1DM. Other diagnoses included ADHD (N = 4), Allergies (N = 1), Asthma (N = 2), Developmental Delays (N = 1), Eczema (N = 1), and Hyperthyroidism (N = 1). The diagnosis inclusion criterion of 1 year was chosen due to well-documented biological and psychological changes during the first year after diagnosis, or the "honeymoon phase" (Grey et al., 2001). Thus, the inclusion criterion was established to decrease the possibility that differences noted between the two groups were related to the initial adjustment of being diagnosed with a chronic illness. Within the Diabetes group, 12 children used insulin injection therapy and 13 children were on the insulin

pump. The mean A_1C for the Diabetes group was 8.3 (SD = 1.1) indicating that this group was in relatively good metabolic control for the age range. A one-way ANOVA indicated that there were no differences in A_1C between the insulin injection (M = 8.4, SD = 1.26) and insulin pump users (M = 8.3, SD = 1.09) (F (1,21) = .03, p = .86). An independent samples t-test indicated no age differences among insulin pump and insulin injections users (t (23) = .30, p = .77). Chi-square analyses also indicated no differences between the insulin pump users and insulin injection users for sex (χ^2 (1, N = 25) = 1.21, p = .27) and race (χ^2 (1, N = 25) = .003, p = .95).

Diabetes participants were recruited through a local Pediatric Endocrinologist at Children's Hospital. Primary means of recruitment involved physician referrals and fliers explaining the research project that were placed in the patient waiting areas. The principal investigator also announced the study and provided fliers during parent support group meetings, Juvenile Diabetes Research Foundation of East Tennessee sanctioned functions, and the East Tennessee Children's Hospital diabetes camp. The fliers briefly described the study and provided contact information for interested families to schedule appointments.

The Non-Diabetes group consisted of 31 children, 19 males and 12 females, between the ages of 7-13 (M = 9.2 yrs., SD = 1.8). A total of 93.5% of participants were Caucasian, 3.2% were African-American, and 3.2% were classified as other. Participants in the Non-Diabetes group did not have a diagnosis of T1DM, however, some reported that they had other diagnosed physical or mental illnesses (18 reported no diagnosis, 7 reported a diagnosis other than T1DM, and 8 did not respond). The other reported diagnoses included ADHD (N = 4), Allergies (N = 3), and Asthma (N

= 1). Non-Diabetes participants were recruited from Knox County schools. Letters announcing the study were sent to all principals in Knox County, and following principal permission, flyers describing the study were sent home to all students within the age range. Interested families in both groups contacted the research team to schedule appointments. Comparisons conducted between the Diabetes and Non-Diabetes groups indicated no differences as a function of age ($\underline{t}$ (54) = 1.3, $\underline{p}$ = .19), sex (χ^2 (2, N = 56) = .43, $\underline{p}$ = .84), and race (χ^2 (2, N = 56) = 1.40, $\underline{p}$ = .50).

Measures

Parent-Report Measures

The Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1986a) is completed by a parent, and may be used for children between the ages of 4-18. This measure assesses total behavioral problems and also identifies internalizing and externalizing problems, with scales that include anxiety, depression, communication, social withdrawal, aggression, and attentiveness. The reported Cronbach alphas for the Internalizing, Externalizing and Total Problems were .90, .94, and .97, respectively (Achenbach & Rescorla, 2001). In examining convergent validity, correlations between the CBCL and other behavior rating forms, such as the Connors Parent Rating Scale-Revised (CPRS-R, 1997) and the Behavioral Assessment System for Children (BASC, 1992) have been conducted. The correlations between the CBCL and the Connors scales ranged from .71 to .85, and correlations between the CBCL and BASC scales ranged from .38 to .89, all of which were statistically significant (Achenbach & Rescorla, 2001).

The Personality Inventory for Children, Second Edition (PIC-2; Lachar, 1999) is a 275 item true-false measure that is completed by parents. The scale is appropriately administered to parents of children between the ages of 5-19, and measures factors that include cognitive impairment, impulsivity, delinquency, family dysfunction, psychological discomfort, social skill deficits, and social withdrawal. Lachar (1999) reported a median Cronbach alpha of .89, with the internal consistency of subscales also strong (range = .80-.96).

The Parental Authority Questionnaire is a 30-item questionnaire that was developed to measure authoritarian, authoritative, and permissive parenting styles (PAQ; Buri, 1991). The scoring is based on a five-point Likert scale (1 being "strongly disagree" to 5 "strongly agree"). The PAQ was developed to measure the parent's perceptions of their parenting style. The Cronbach alpha for Parental Permissiveness was .75; for Parental Authoritarianism was .85; and for Parental Authoritativeness was .82, indicating adequate internal consistency (Buri, 1991). According to Buri (1991), Parental Authoritarianism was inversely related to Parental Permissiveness ($r = -.38$, $\underline{p} < .001$) and to parental Authoritativeness ($r = -.48$, $\underline{p} < .001$). Parental Permissiveness was not associated with Parental Authoritativeness ($r = .07$, $\underline{p} < .10$), thus supporting some level of discriminant validity. In the present study, internal consistency of the PAQ was similar to data previously reported (Parental Permissiveness $\alpha = .75$, Parental Authoritarianism $\alpha = .85$, Parental Authoritativeness $\alpha = .73$).

The Family Environment Scale (FES; Moos & Moos, 2002) is a 90-item true-false scale with good psychometric characteristics that is designed to measure the

social environment of families. It is composed of 10 subscales that cluster into three factors (Kronenberg & Thompson, 1990). The *Supportive* factor includes the Cohesion, Expressiveness, Independence, Active-recreational Orientation, and Intellectual-cultural orientation subscales. It measures family mutual interest, concern, support, and activities across a wide domain. The *Conflict* factor includes the Conflict, Cohesion (negative direction) and Organization (negative direction) subscales. The *Controlling* factor includes the Control, Achievement Orientation, Moral-Religious emphasis, and Independence (negative direction) subscales. This factor represents the use of expectations and rules to control the family environment. Moos and Moos (2002) have demonstrated adequate internal consistency (α = .61-.78) and good test-retest reliability for all subscales (r = .68 -.82). Various measures have been used to establish good content and construct validity such as the Family Adaptability and Cohesion Evaluation Scale (FACES-II) and the Family Assessment Device (FAD) (see Moos & Moos, 2002 for a full review).

Child-Report Measures

The Children's Depression Inventory (CDI; Kovacs, 1992) is a 27-item self-report measure of depressive symptoms in children and adolescents (aged 7-17 years). The 27 items are presented in groups of three statements, where the severity of each item is scored using a 3-point scale ranging from 0 (absence of a symptom) to 2 (definite symptom). Internal consistency of the scales is strong. Kovacs noted that the Cronbach alpha for a psychiatrically referred sample was .86, for a pediatric-medically referred group was .71, and for a large public school sample was .87

(Kovacs, 1992). Kovacs (1992) demonstrated that the test-retest reliability was .75. See Barreto (1994) for a further discussion of the psychometric properties of the measure. The Cronbach alpha for the present study was .89, indicating strong internal consistency.

The Revised Children's Manifest Anxiety Scale (R-CMAS; Reynolds & Richmond, 1985) is a 37-item self-report measure designed to assess anxiety symptoms in children aged 6-19 years old. The child responds to each item by circling either "yes" or "no," depending on whether the item is descriptive of the child's feelings or actions. The internal consistency of the R-CMAS total and subscale scores has been demonstrated to be adequate (R-CMAS manual; Reynolds & Richmond, 1985). Good convergent validity of the measure with the State-Trait Anxiety Inventory for children (STAIC; Spielberger, 1973) has been established ($r = .68$, $\underline{p} < .001$) (Reynolds & Richmond, 1985). In the present study, the Cronbach alpha was .79.

Diabetes-Specific Measures

The Diabetes Quality of Life for Children scale (DQOL-C; Schwartzman & Hopko, in progress) is a 50 item self-report measure designed to assess perceptions of general life satisfaction and social concerns related to either Type I or Type II diabetes as experienced among children aged 6-18. The measure used in the present study is separated into three subscales: impact of diabetes, worries about diabetes, and life satisfaction. The impact of diabetes and worries about diabetes subscales are based on a five-point Likert scale ranging from 1 ("never") to 5 ("all the time"). The

life satisfaction subtest is also based on a five-point Likert scale ranging from 1 ("very unsatisfied") to 5 ("very satisfied"). An additional question asks how the child compares his/her health with peers. The Cronbach alpha for the present study was .80, indicating good internal consistency. The DQOL-C was adapted from the Diabetes Quality of Life for Youth scale (DQOL-Y, Ingersoll & Marrero, 1991) and the Diabetes Quality of Life scale (Diabetes Control and Complications Trial Research Group, 1988) to better suit the population. Questions from the DQOL-Y were modified to reflect the concerns of children within the age range, as well as in language commonly used by pre-adolescents. For example, items from the DQOL-Y may ask, "How often does your diabetes keep you from driving a car or using a machine (for example, a typewriter)?" "How often do you worry about whether you will get married?" and similar items from the DQOL-C ask, "How often does your diabetes restrict physical activity (like P.E. class, sports, or playing outside?" "Because of your diabetes, how often do you worry that you will not have friends?" The DQOL-Y was developed for adolescents with an average age of 16-years old (range = 10 to 21 years), and the original DQOL was developed to assess the relative burden of diabetes and diabetes related treatment for individuals greater than 13-years old. The internal consistency of the DQOL-Y (Ingersoll & Marrero, 1991) was .85, with good internal consistency across all subscales: .85 for satisfaction, .83 for impact, and .82 for worries.

The Hemoglobin A_1C was used to assess metabolic control in IDDM participants. The patients' physician administered the blood test, and results were provided to the experimenters upon consent for release of information by the

participant's parents. Higher A_1C percentages corresponded to poorer control (non-diabetic: range 4.3-6.3%).

Teacher-Completed Measure

The Teacher's Report Form (TRF; Achenbach & Edelbrock, 1986b) is completed by a teacher, and may be used for children between the ages of 4-18. This measure assesses internalizing and externalizing problems within the school environment, with scales that include anxiety, social withdrawal, popularity, attentiveness, and aggression. The Cronbach alphas for the Internalizing, Externalizing and Total Problems were .90, .95, and .97, respectively. Correlations between the CBCL and other behavior rating forms, such as the Connors Teacher Rating Scale-Revised (C-TRS-R, 1997) and the Behavioral Assessment System for Children (BASC, 1992) have been conducted. The correlations between the TRF and the Connors scales ranged from .71 to .85, and the correlations between the CBCL and BASC scales ranged from .38 to .89, all of which were statistically significant (Achenbach & Rescorla, 2001).

Procedure

Participants completed the questionnaires in the Psychology Department at the University of Tennessee. Families were compensated $20.00 for their participation in the study. The parent and child initially completed the consent and assent forms, respectively. The parent also was asked to sign an authorization to use and disclose protected health information (PHI). This form, in compliance with

HIPAA, allowed the research team to access medical information for the Diabetes group and authorized the release of the name of the child participant to the school for behavioral information and teacher completion of the TRF for both groups.

Once the parent and child participants consented to participate, the parent completed a demographics questionnaire on which the patient's identifying characteristics and medical information were recorded. The parents also completed the CBCL, PIC-2, FES, and PAQ. All child participants completed the CDI, and R-CMAS within the UT Psychology Department. The Diabetes participants (i.e., pre-adolescents with diabetes) completed the DQOL-C, and their physician provided the results from most recent Hemoglobin A_1C. The duration of this assessment was approximately 1.5-2.5 hours. The parents were asked to choose a teacher who knew their child best to complete the TRF. The required consent form, TRF, and return envelope were sent via mail to the teacher and returned to the researchers. Data was collected from April 2003 to August 2005.

CHAPTER III

RESULTS

Descriptive statistics of all the measures and subscales used in the study can be found in Tables A-1 through A-3 in the Appendices. Descriptive statistics are reported for the entire sample, and then separated for the Diabetes and Non-Diabetes groups, as well as the Insulin Injection and Insulin Pump groups. Coefficient alphas for select measures included in the present study are also reported in Table A-1. Due to the strong and stable internal consistencies reported in the literature of the CBCL, TRF, FES, and PIC-2, Cronbach alphas were not conducted for these measures in the present study. Descriptive statistics for the CDI, CBCL, TRF, FES, and PIC-2 are reported as T-scores. The total anxiety subscale of the R-CMAS is reported as a T-score, and the remaining subscales are reported as scaled scores based on the children's age, race, and gender. The DQOL-C subscales are reported as mean responses such that lower scores indicate better quality of life. The PAQ provides categorical data on parenting style. A Chi-square analysis was conducted (χ^2 (1) = 1.48, $\underline{p}$ = .23) among the Non-Diabetes and Diabetes groups, indicating no differences between the two groups for parenting style. A chi-square analysis was not conducted among the insulin pump and insulin injection users as 100% of parents in the Diabetes group classified themselves as authoritative.

Bivariate correlations were conducted among parent and teacher reports of internalizing and externalizing behaviors as measured by the CBCL and TRF (see

Table A-4). The CBCL total problems score was positively associated with CBCL internalizing ($r = .81$, $p < .01$) and externalizing problems ($r = .82$, $p < .01$), with internalizing and externalizing problems moderately associated ($r = .57$, $p < .01$). However, the CBCL total problems score, internalizing problems, and externalizing problems scales were not significantly associated to those reported by the teacher on the TRF. Similar to the CBCL, the TRF total problems scale was positively related to the TRF internalizing ($r = .83$, $p < .01$) and externalizing problems scales ($r = .87$, $p < .01$), with the TRF internalizing and externalizing problems scales moderately associated ($r = .69$, $p < .01$).

Other bivariate correlations assessed included relations among metabolic control as measured by Hemoglobin A_1C, family cohesion (Cohesion subscale of the FES), quality of life (Total score of the DQOL-C), authoritative parenting style (Authoritativeness scale of the PAQ), depressive (CDI) and anxiety (R-CMAS) symptoms, and internalizing and externalizing subscales from the CBCL and TRF. The authoritative parenting subscale was included in this analysis as a dichotomous variable. The parents receive a score of the three subscales of the PAQ (ranging 10-50). A dichotomous variable ("yes" and "no") was developed based on the total score the parents obtained on the authoritative subscale to reflect the predominant parenting style. This correlation matrix can also be found in Table A-4. Metabolic control was not associated with family cohesion, parenting style, quality of life, or depressive and anxiety symptoms. The total anxiety scale of the R-CMAS was significantly related to the total score on the CDI ($r = .40$, $p < .01$) and the total score on the DQOL-C ($r = .68$, $p < .01$). The total score on the CDI also was significantly

related to the CBCL total problems scale ($r = .31$, $p < .05$). The CBCL total problems scale was significantly and inversely related to family cohesion ($r = -.30$, $p < .05$), and the CBCL externalizing subscale was also inversely related to family cohesion ($r = -.27$, $p < .05$). A correlation coefficient was not specified between the authoritative parenting style and the subscales of the TRF due to missing data.

Univariate analyses were conducted first between the Diabetes and Non-Diabetes groups. ANOVA tables are presented in appendices (Tables A-5 through A-7). There were no significant differences on self-reported scores from the R-CMAS and CDI between children with T1DM and children without T1DM. Teachers also did not report significant differences on the TRF between children with T1DM and children without T1DM. However, parents reported differences on the CBCL, FES, and PIC-2. Specifically, significant differences were found between children with T1DM and Non-Diabetes on parent reported CBCL social problems ($F (1, 54) = 7.06$, $p < .01$), CBCL thought problems ($F (1, 54) = 5.47$, $p < .05$), and CBCL aggressive behaviors ($F (1, 54) = 4.33$, $p < .05$). These results indicate that parents of children with T1DM reported more problems with social behaviors, thought problems, and aggressive behaviors compared to parents of children without T1DM. Parents of children with T1DM also reported significantly less independence on the FES compared to parents in the Non-Diabetes group ($F (1, 54) = 9.29$, $p < .01$). On the PIC-2, parents of T1DM children reported significantly more cognitive problems ($F (1, 54) = 4.73$, $p < .05$), dyscontrol ($F (1, 54) = 7.16$, $p < .01$), somatic complaints ($F (1, 54) = 8.16$, $p < .01$), psychosomatic preoccupation ($F (1, 54) =$

10.39, $p < .01$), psychological distress (F (1, 54) = 5.09, $p < .05$), and depression (F (1, 54) = 4.48, $p < .05$).

A one-way ANOVA was conducted between children in good metabolic control and children in poor metabolic control. Children were assigned to each group based on their A_1C. If the A_1C fell below the Diabetes group mean (M = 8.3), then the child was considered in good metabolic control, and if the A_1C fell above the mean then the child was considered in poor metabolic control. There were no differences on self-reported scores from the CDI, R-CMAS, and the DQOL-C between those children in good or poor metabolic control. Teachers did not report differences between these two groups on the TRF, and parents did not report differences on the CBCL, PAQ, or FES. Significant differences were noted among parent-reported personality characteristics on the PIC-2. Specifically, parents of children in good metabolic control reported fewer symptoms of withdrawal (F (1, 22) = 7.07, $p < .05$) and isolation (F (1, 22) = 6.65, $p < .05$).

Univariate analyses were then conducted between the insulin injection and insulin pump groups, and ANOVA tables are presented (see Tables A-9 and A-10). There were no differences on self-reported scores from the R-CMAS and the DQOL-C between insulin injection and insulin pump users. Teachers did not report differences between these two groups on the TRF, and parents did not report differences on the CBCL or FES. Differences between the insulin injection and insulin pump users were found on self-reported anhedonia on the CDI (F (1, 23) = 5.13, $p < .05$), indicating that children using insulin injection reported more feelings of anhedonia than children using the insulin pump. Parents also reported differences

on the PIC-2, with parents of children using insulin injections reporting more symptoms of withdrawal (F (1, 23) = 5.07, $p < .05$) and isolation (F (1, 23) = 6.11, $p < .05$).

CHAPTER IV

DISCUSSION

The present study attempted to assess psychosocial variables as they potentially differed between children and adolescents with and without T1DM, as well as a function of diabetes treatment. A multi-method approach of examining self-, parent-, and teacher reported depression, anxiety, behavioral regulation, personality, and family functioning was utilized to identify whether children and adolescents with T1DM were distinguishable from age-matched peers without T1DM, and whether those using insulin injections were different from those using the insulin pump.

The first hypothesis was that parent and teacher reports of internalizing and externalizing behaviors would be significantly related as assessed by the CBCL and TRF. The results indicated that parent and teacher reported behavioral problems were not significantly correlated. Multiple raters were used to assess internalizing and externalizing symptoms, but it is evident that different raters' view actions and behaviors quite divergently. Achenbach, McConaughy, and Howell (1987) conducted a meta-analysis examining inter-rater reliability on the CBCL and TRF, and this study indicated that the overall agreement between raters was acceptable ($r = .60$) if the raters had similar relationships to the target child (i.e., both parents or two teachers). However, agreement across multiple raters was poor ($r = .28$) if the raters did not have similar relationships to the child, such as a teacher versus parental report (Achenbach et al., 1987). Another study suggested that parent reports might not

always be confirmed by teacher reports (Briggs-Gowan, Carter, & Schwab-Stone, 1996). These findings do not necessarily suggest that multiple raters are not informative or reliable, but rather that child and adolescent behavioral problems may be highly contextual.

Following the existing literature on family dynamics and T1DM, the second hypothesis was that there would be significant positive associations among family cohesion, authoritative parenting, quality of life, and metabolic control and significant inverse relationships of these variables with depressive and anxiety symptoms. Increased family cohesion and authoritative parenting have been associated with better metabolic control and decreased depressive symptoms (Cohen et al., 2004; Davis et al., 2001), and it was hypothesized that the present study would find similar relationships. The results indicated that metabolic control was not related to family cohesion, authoritative parenting, quality of life, or depressive and anxiety symptoms. Authoritative parenting style also was not significantly related to family cohesion, quality of life, or depressive and anxiety symptoms. Perhaps the differences in findings between the present study and earlier works were probably related to sample size issues. The present study included a small sample of 25 children with T1DM compared to other studies including 50 or more children (Cohen et al., 2004; Davis et al., 2001). It is also conceivable that there were no significant associations among metabolic control and family cohesion, authoritative parenting, quality of life, or depressive and anxiety symptoms in the present study due to the relatively good metabolic control of the Diabetes group ($M = 8.3$, $SD = 1.1$). Cohen et al., (2004) also examined relationships among metabolic control and family

cohesion, and the mean A_1C was higher (M = 11.1, SD = 2.6), indicating that participants in their study were in poorer metabolic control. Other methodological differences between the present and previous studies could also explain divergent findings. For example, Cohen et al., (2004) examined relationships among family cohesion, internalizing and externalizing behaviors, and adherence, which was defined as a function of metabolic control, routine doctor visits, and regular glucose checks. Davis et al., (2001) also included a variable of adherence measured by self-report. The present study only examined metabolic control and not adherence. Another methodological difference was the use of differing instruments. Parenting style was measured with different self-report instruments in the Davis et al., (2001), and the Cohen et al., (2004) study utilized another measure for family cohesion.

Continuing with the second hypothesis, child-reported anxiety symptoms, as measured by the R-CMAS, were significantly and positively related to child-reported symptoms of depression and significantly and inversely associated with self-reported quality of life. The finding that child-reported anxiety symptoms and child-reported quality of life were related was a clinically important finding. Although we cannot address causality, perhaps children who report decreased anxiety symptoms have increased quality of life due to fewer worries and concerns about their illness, which may lead to more opportunities for rewarding experiences. Self-reported depressive symptoms, as measured by the CDI, were positively associated with parent-reported total behavior problems on the CBCL. Children who endorsed more depressive symptoms had parents who endorsed more internalizing and externalizing problems. Parent-reported internalizing and externalizing behavior problems also were inversely

related to parent reported family cohesion. Previous research has indicated a bi-directional relationship among family cohesion and children's behavioral problems such that highly cohesive families tend to have children with fewer disruptive behavior problems, yet there is a tendency for increased behavioral problems in children from families low in cohesion (Holmes, Yu, & Frentz, 1999). Perhaps, families with higher cohesiveness and lower conflict may serve as a buffer against the stress caused my managing T1DM, thus protecting their children from developing disruptive behaviors (Holmes, Yu, & Frentz, 1999).

The results of the present study indicated a non-convergence between parent-child and parent-teacher ratings. Previous research has indicated similar non-convergence between parent-child reports of anxiety, as well as internalizing and externalizing behaviors (Barbosa, Tannock, & Manassis, 2002; Edelbrock, Costello, Dulcan, Conover, & Kalas, 1986; Klein, 1991). Some discrepancies may be related to the use of different instruments in which the parent and child completed, as well as the contextual nature of children's behaviors, such as behavioral differences in the home compared to behaviors in the school (Achenbach et al., 1987; Barbosa, Tannock, & Manassis, 2002). Other discrepancies may be associated with item response biases. Specifically, children tend to report more internalizing problems and parents tend to report more externalizing problems (Edelbrock et al., 1986). Reasons why children and parents may over- or under-report psychological symptoms have been examined in several studies (Barbosa et al., 2002; Edelbrock et al., 1986; Grills & Ollendick, 2002). For example, family members may simply disagree on the presence or absence of maladaptive behaviors, parents may under-report symptoms in

order to conceal negative childhood behaviors, family problems, or marital difficulties, and children may under-report symptoms for fear or negative consequences (Barbosa et al., 2002; Grills & Ollendick, 2002). A child's age may also be a factor in understanding these discrepancies (Edelbrock et al., 1986). In this study, there was significantly greater agreement between parents and children age 14-18 years old compared with children 6-9 years old (Edelbrock et al., 1986).

As a third hypothesis, it was posited that children with T1DM would have increased symptoms of depression and anxiety and behavioral problems compared to children without T1DM. Although child self-report measures did not support this hypothesis, parents of children with T1DM reported increased depression (PIC-2 psychological distress and depression subscales) and somatization (PIC-2 somatic complaints and PIC-2 psychosomatic preoccupation subscales) relative to parents of children without T1DM, which is consistent with the extant literature (Grey, Whittemore, & Tamborlane, 2002; Kovacs et al., 1997). However, Grey et al., (1994) suggested that children with T1DM do not have increased anxiety symptoms compared to children without T1DM, a notion supported in the present study. Interestingly, children with T1DM reported no more substantial symptoms of depression and anxiety than did their peers without T1DM. Possibly this difference between parent and self-reported symptoms of depression is related to children minimizing psychological distress compared to parents (Edelbrock et al., 1986).

In line with the third hypothesis, results provide some support for the predictions of increased social problems, thought problems, aggressive behaviors, as well as personality characteristics of dyscontrol in children with T1DM (i.e. poorly

modulated anger, argumentative, and poor judgment). Perhaps, the social deficits noted among the T1DM sample are a function of the illness. The extant literature suggested that children with T1DM exhibit social deficits relative to their non-chronically ill peers, including increased internalizing and externalizing behavior problems (Alderfer et al., 2001, 2002; Holmes, Yu, & Frentz, 1999). Several studies have found that children with T1DM are at-risk for social and behavioral problems, and these difficulties may be a function of stress related to diabetes management (Blanz et al., 1993; Holmes, Yu, & Frentz, 1999). Other studies indicate that social problems, including peer rejection, may be predicted by increased severity and impact of diabetes on daily functioning (Alderfer et al., 2001, 2002).

Supporting the fourth hypothesis, there was some support for the idea that children with T1DM had increased personality and family problems compared to children without T1DM. Parents of children with T1DM reported significantly less independence in their children relative to parents of non-diabetic children. Independence and autonomy is certainly desired among the age groups included in this study (Davis et al., 2001). Current research has examined independence among children with T1DM and the possible implications such freedom may have on diabetes management, and it is likely that families with chronically ill children do not allow for as much freedom as families not having a child with chronic illness (Gonder-Frederick et al., 2002). Parents of children with T1DM also reported significant cognitive differences as indicated by the CBCL Thought Problems and PIC-2 Cognitive Difficulties subscales, with these findings considered somewhat surprising. It is a possibility that the children with T1DM have experienced some

complications from their illness, which may have affected their cognitive processes, such as Diabetic Ketoacidosis or unconsciousness from severe hypo-glycemia. It is also conceivable that parents of T1DM children perceive their children as having more frequent cognitive difficulties, such as memory or attention problems, due to increased vigilance of these issues as a function of monitoring child adherence to T1DM treatment requirements.

As a fifth hypothesis, it was posited that children in good metabolic control would have fewer self, parent, and teacher reported symptoms of depression, anxiety, quality of life, behavioral problems, personality problems, and family difficulties compared to children in poorer metabolic control. The findings indicated no differences among self-reported depression, anxiety, and quality of life. Nor were there significant differences among parent- and teacher-reported internalizing and externalizing behavior problems, and no significant differences were noted among parent reported family difficulties. The results did indicate that parents of children in good metabolic control reported significantly fewer symptoms of withdrawal and isolation compared to parents of children in poor metabolic control.

The sixth hypothesis predicted that children using the insulin pump would have fewer self, parent, and teacher reported symptoms of depression, anxiety, behavioral problems compared to children using insulin injections. Present findings revealed no differences in self-reported anxiety, and parent and teacher reported behavior problems between children using the insulin pump and children using insulin injections, perhaps suggesting that the daily routines and exposure to environmentally rewarding experiences is less affected in pump users. However, the

findings convey that children using the insulin pump reported fewer symptoms of anhedonia compared with children using insulin injections.

The seventh hypothesis posited that children using the insulin pump would report an increased quality of life compared to children using insulin injections. There is a paucity of data examining diabetes treatment and psychosocial adjustment, but it is suggested that the insulin pump increases activity and meal flexibility and improves metabolic control, which may affect mood and quality of life (Boland et al., 1999; Mednick et al., 2004). Research on quality of life and metabolic control is equivocal, however, with two studies indicating a positive association between these variables (Delameter, 2000; Rubin, 2000), and two others finding no significant associations between these variables (Grey, Davidson, Boland, & Tamborlane, 2001; Worrall-Davies et al., 1999).

The eighth hypothesis stated that children using the insulin pump would have decreased family difficulties and personality problems compared to children using insulin injections. Significant differences in family environment between insulin pump and insulin injection users also were not identified. Significant differences in parent-reported personality characteristics of withdrawal and isolation also were noted in that parents of children using the insulin pump reported fewer personality problems compared with parents of children using insulin injections.

These findings are clinically significant in that minimal research has explored the psychosocial differences between insulin pump and insulin injection users, despite documented findings that the insulin pump improves metabolic control, minimizes restrictions on exercise and meal planning, and may decrease

stigmatization of being different (Boland et al., 1999). Although much more research is needed to explore the present findings, it is conceivable that children using the insulin pump are noticing fewer restrictions on rewarding activities that include enhanced social interactions, as well as improving their metabolic control.

The data from the present study demonstrate that children with T1DM may be at risk for developing social deficits, cognitive problems, and mood disorders. Treatment for children with T1DM ought to include regular screenings for such problems during medical visits. Also, providing parents with appropriate tools for supporting a child with a chronic illness could be beneficial. The extant literature indicates that premature autonomy of diabetes management may be problematic, whereas children who control their medical regimen are more likely to exhibit poorer metabolic control compared to children whose parents are involved with disease management (Gonder-Frederick et al., 2002). On the other hand, over controlling parents could also lead to psychological difficulties, although a child's metabolic control may improve (Close, Davies, Price, & Goodyer, 1986; Eiser, 1990). Providing parents with effective communication skills to address this delicate subject may be helpful. Several treatment-focused studies have attempted to improve the relationships between children and adolescents and their families, as well as improve treatment adherence and metabolic control (Burroughs, Harris, Pontious, & Santiago, 1997). There is some evidence that family interventions may improve metabolic control in children and adolescents, especially if the interventions are implemented early in the disease (Anderson, Brackett, Ho, & Laffel, 2000). These home and office based interventions involved both the parents and children working together in

diabetes related tasks, and several treatment-outcome studies indicated that increased parental involvement during the transition of diabetes management was associated with more positive parent-adolescent relationships and more effective diabetes management (Anderson, Brackett, Ho, & Laffel, 1999; Harris & Mertlich, 2003).

Limitations and Directions for Future Research

One main limitation to the present study involves the issue of sampling size and potential sampling bias. The Diabetes group consisted of 25 participants and our Non-Diabetes group had 31, sample sizes that are relatively small, which could have increased the likelihood of a Type II error. Although sampling difficulties were not anticipated, particular difficulties were associated with recruiting the Diabetes group. For example, only one pediatric endocrinology practice was willing to participate in the study in Knoxville and the surrounding areas. Within this one practice, half of their patient population met inclusion criteria, such as being within the age range of 7-13 and having T1DM for at least 1-year. However, few families were willing to participate, either due to time constraints, transportation issues, or lack of interest. Potential sampling errors within our Non-Diabetes group also were identified. For example, the Non-Diabetes group was recruited from Knox County Schools, and several schools were unwilling to participate in distributing the announcement fliers. Additionally, of those interested families who met inclusion criteria for the Non-Diabetes group, many parents were concerned that their children had some type of psychological distress, be it depressive or anxiety symptoms or impulsivity and hyperactivity. Accordingly, the Non-Diabetes group might not have represented a

"true" control group insofar as it was characterized by participants with various emotional and behavioral problems.

As a second limitation, given the multiple number of statistical tests that were conducted, it is conceivable that one or more of the statistically significant findings represent a Type I error. However, given the potential problems associated with statistical adjustment procedures, such as the Bonferroni connection (Perneger, 1998), these statistical methods were not incorporated. A third limitation could be a parental bias. Fifty-three of the 56 parents who participated in the study were female, and female parents could view their children's behaviors quite differently than male parents. Likewise, female parents may view their parenting practices and family functioning divergently from male parents.

The present study assessed psychosocial adjustment among children with T1DM compared with age-matched peers without diabetes utilizing a multi-method approach. Many facets of adjustment, such as affective adjustment, behavioral functioning, family functioning, and personality characteristics were examined. This is an important issue, and the extant literature remains equivocal. Future research involving large and more diverse samples would be beneficial in identifying possible differences among children with T1DM and their non-chronically ill peers. The role of the family is becoming another major focus of attention, as these relationships appear to affect diabetes management, and future research should further explore possible associations. Future research should also explore the possible differences in psychosocial adjustment as a function of metabolic control and diabetes treatment. The present study demonstrated that there are some affective differences (i.e.

anhedonia) between children using the insulin pump and insulin injections, however the statistical tests used to determine if these differences were a function of metabolic control or increased behavioral freedom that the insulin pump might provide was not feasible due to the limited sample size (e.g. mediational analysis). It would be beneficial to better understand why children using the insulin pump reported fewer symptoms of anhedonia and why parents reported less withdrawal and isolation.

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APPENDICES

Table A-1

Descriptive Statistics of Measures for the Entire Study

Measure	Subscales	N	Mean	SD	Alpha
RCMAS					.79
	Lie	56	9.4	3.02	
	Total Anxiety*	56	45.6	9.56	
	Social Concerns	56	8.2	2.56	
	Worry	56	8.2	2.75	
	Physical Anxiety	56	8.7	2.86	
DQOL-C**					.80
	Total Quality of Life	25	2.1	.51	
	Impact of Diabetes	25	2.0	.56	
	Worries about Diabetes	25	1.7	.78	
	Feelings about Diabetes	25	2.5	.80	
CDI*					.89
	Total	56	44.7	10.79	
	Negative Mood	56	46.4	11.17	
	Interpersonal Problems	56	47.7	10.99	
	Ineffectiveness	56	46.0	9.18	
	Anhedonia	56	47.7	10.67	
	Negative Self-esteem	56	44.4	6.68	
CBCL*					
	Total Problems	56	52.5	10.21	
	Internalizing Problems	56	54.2	11.05	
	Externalizing Problems	56	56.0	9.72	
	Anxiety/Depression	56	55.6	6.81	
	Withdrawn	56	55.3	6.65	
	Somatic Complaints	56	57.5	8.43	
	Social Problems	56	55.2	6.42	
	Thought Problems	56	55.0	5.92	
	Attention Problems	56	56.5	9.08	
	Rule Breaking Behavior	56	54.1	5.82	
	Aggressive Behavior	56	54.6	7.50	
TRF*					
	Total Problems	22	48.5	10.02	
	Internalizing Problems	22	50.5	10.40	
	Externalizing Problems	22	49.9	7.83	
	Anxiety/Depression	22	54.3	6.45	
	Withdrawn	22	53.0	4.74	
	Somatic Complaints	22	55.1	8.06	
	Social Problems	22	52.2	3.43	
	Thought Problems	22	54.2	5.95	
	Attention Problems	22	52.8	4.48	
	Rule Breaking Behavior	22	52.7	4.28	
	Aggressive Behavior	22	53.3	4.82	

Table A-1 Continued

Measure	Subscales	N	Mean	SD	Alpha
PAQ					
	Parental Permissiveness				.75
	Parental Authoritarianism				.85
	Parental Authoritativeness				.73
FES*					
	Cohesion	56	59.6	6.48	
	Expressiveness	56	52.4	15.06	
	Conflict	56	45.1	10.92	
	Independence	56	44.7	10.67	
	Achievement Orientation	56	47.8	8.53	
	Intellectual-Cultural	56	57.3	8.77	
	Activity	56	54.1	11.20	
	Moral-Religious	56	62.0	8.87	
	Organization	56	51.3	12.02	
	Control	56	55.9	9.21	
PIC*					
	Inconsistency	56	47.6	6.69	
	Dissimulation (FB)	56	50.0	8.45	
	Defensiveness	56	51.0	7.12	
	Cognitive Problems	56	50.5	10.79	
	Impulsivity and Distractibility	56	51.6	10.36	
	Delinquency	56	48.3	8.03	
	Family Problems	56	47.4	5.15	
	Reality Testing	56	49.0	8.77	
	Somatic Complaints	56	50.9	9.99	
	Psychological Discomfort	56	53.4	11.58	
	Withdrawal	56	48.5	9.17	
	Social Skills	56	50.9	9.92	

Note: Measures with * are reported T-scores. **DQOL-C was only given to the Diabetes group

Table A-2

Descriptive Statistics of Measures for Non-Diabetes and Diabetes Groups

Measure	Subscales	Non-Diabetes		Diabetes	
		Mean	SD	Mean	SD
RCMAS					
	Lie	8.9	2.84	10.0	3.18
	Total Anxiety*	45.7	9.81	45.4	9.44
	Social Concerns	8.1	2.95	8.4	2.02
	Worry	8.5	2.67	7.8	2.84
	Physical Anxiety	8.5	2.74	9.0	3.04
CDI*					
	Total	43.7	10.69	46.1	10.97
	Negative Mood	45.9	7.59	47.0	14.61
	Interpersonal	47.9	10.72	47.5	11.53
	Ineffectiveness	46.0	10.10	46.1	8.10
	Anhedonia	47.4	10.49	48.0	11.10
	Negative SE	44.5	6.43	44.3	7.10
CBCL*					
	Total Problems	50.9	9.07	54.5	11.34
	Internalizing	53.0	11.43	55.7	10.59
	Externalizing	48.3	8.04	53.4	11.00
	Anxiety/Depression	55.3	6.43	56.1	7.38
	Withdrawn	54.9	6.03	55.9	7.44
	Somatic	56.7	7.67	58.5	9.35
	Social Problems	53.2	4.12	57.6	7.89
	Thought	53.4	5.03	57.0	6.43
	Attention	55.5	8.60	57.8	9.68
	Rule Breaking	52.8	4.64	55.7	6.77
	Aggressive	52.8	3.17	56.8	10.33
TRF*					
	Total Problems	50.2	8.98	47.2	11.03
	Internalizing	52.2	10.15	49.2	10.85
	Externalizing	50.6	6.72	49.4	8.92
	Anxiety/Depression	56.5	8.54	52.5	3.42
	Withdrawn	52.6	3.66	53.3	5.63
	Somatic	54.0	6.82	56.1	9.15
	Social Problems	51.9	3.07	52.5	3.80
	Thought	55.5	6.70	53.1	4.99
	Attention	53.5	5.06	52.3	4.07
	Rule Breaking	53.0	4.00	52.5	4.66
	Aggressive	52.7	3.71	53.9	5.68

Table A-2 Continued

Measure	Subscales	Non-Diabetes		Diabetes	
		Mean	SD	Mean	SD
FES*					
	Cohesion	59.5	7.46	59.7	5.17
	Expressiveness	55.3	10.71	48.8	18.77
	Conflict	44.3	10.38	46.1	11.70
	Independence	48.3	9.64	40.2	10.33
	Achievement	46.8	7.82	49.1	9.34
	Intellectual	58.6	7.81	55.8	9.76
	Activity	52.9	12.66	55.5	9.11
	Moral-Religious	62.6	9.09	61.2	8.72
	Organization	51.0	12.75	51.6	11.29
	Control	56.4	9.17	55.2	9.41
PIC*					
	Inconsistency	46.5	5.57	48.9	7.77
	Dissimulation	48.4	6.64	52.0	10.05
	Defensiveness	52.9	6.16	48.7	7.64
	Cognitive	47.7	7.65	53.8	13.12
	Impulsivity	50.2	9.87	53.3	10.90
	Delinquency	46.7	5.42	50.4	10.16
	Family Problems	47.4	5.40	47.3	4.94
	Reality Testing	47.0	.74	51.3	11.16
	Somatic	47.7	6.84	54.9	11.85
	Psychological	50.3	10.01	57.1	12.48
	Withdrawal	48.3	10.04	48.8	9.26
	Social Skills	51.4	8.93	50.2	11.18

Note: Measures with * are reported T-scores. Interpersonal = CDI Interpersonal Problems; Negative SE = CDI Negative Self-Esteem; Anxiety/Dep. = CBCL Anxiety/Depression; Somatic = CBCL Somatic Complaints; Thought = CBCL Thought Problems; Attention = CBCL Attention Problems; Rule Breaking = CBCL Rule Breaking Behaviors; Aggressive = CBCL Aggressive Behaviors; Anxiety/Dep. = TRF Anxiety/Depression; Somatic = TRF Somatic Complaints; Thought = TRF Thought Problems; Attention = TRF Attention Problems; Rule Breaking = TRF Rule Breaking Behaviors; Aggressive = TRF Aggressive Behaviors; Achievement = FES Achievement Orientation; Intellectual = FES Intellectual-Cultural; Cognitive = PIC Cognitive Problems; Impulsivity = PIC Impulsivity and Distractibility; Somatic = PIC Somatic Complaints; Psychological = PIC Psychological Discomfort.

Table A-3

Descriptive Statistics of Measures for the Insulin Pump and Injection Groups

Measure	Subscales	Insulin Pump		Injection	
		Mean	SD	Mean	SD
RCMAS					
	Lie	10.2	3.27	9.8	3.21
	Total Anxiety*	44.1	8.51	46.8	10.54
	Social Concerns	8.3	2.21	8.4	1.88
	Worry	7.1	2.07	8.5	3.45
	Physical Anxiety	8.9	2.28	9.1	3.80
DQOL-C					
	Total	2.1	.37	2.0	.64
	Impact	2.0	.40	1.9	.71
	Worries	1.7	.79	1.7	.82
	Feelings	2.5	.73	2.5	.90
CDI*					
	Total	42.1	5.24	50.4	13.93
	Negative Mood	42.4	14.69	52.1	13.32
	Interpersonal	44.6	5.96	50.5	15.22
	Ineffectiveness	44.2	5.93	48.2	9.80
	Anhedonia	43.6	5.20	52.9	13.79
	Negative SE	42.0	4.71	46.8	8.52
CBCL*					
	Total Problems	56.4	13.35	52.5	12.79
	Internalizing	56.4	7.74	55.0	13.34
	Externalizing	54.7	13.08	51.9	8.53
	Anxiety/Depression	56.0	6.69	56.3	8.36
	Withdrawn	54.5	7.67	57.5	7.19
	Somatic	58.2	6.67	58.8	11.92
	Social Problems	58.4	7.14	56.8	7.19
	Thought	58.9	7.22	54.9	4.94
	Attention	58.4	8.65	57.2	11.04
	Rule Breaking	57.7	7.74	53.7	5.05
	Aggressive	58.5	13.35	55.2	5.67
	Rule Breaking	51.7	3.50	50.0	.00
	Aggressive	54.2	4.19	50.5	.71
TRF*					
	Total Problems	45.6	13.23	48.8	9.30
	Internalizing	46.3	7.94	52.2	13.24
	Externalizing	49.8	11.50	49.0	6.51
	Anxiety/Depression	52.8	3.66	51.2	3.49
	Withdrawn	51.5	2.81	55.2	7.33
	Somatic	51.3	3.26	61.0	10.84
	Social Problems	52.8	4.66	52.3	3.14
	Thought	51.6	6.50	54.7	5.72

Table A-3 Continued

Measure	Subscales	Insulin Pump		Injection	
		Mean	SD	Mean	SD
TRF*					
	Attention	53.5	5.64	51.2	1.17
	Rule Breaking	53.6	6.50	51.3	1.51
	Aggressive	55.0	7.77	52.8	2.79
FES*					
	Cohesion	60.6	4.80	58.7	5.55
	Expressiveness	49.9	21.10	47.7	16.75
	Conflict	49.5	12.78	42.5	9.60
	Independence	38.8	9.88	41.7	11.03
	Achievement	49.0	11.03	49.3	7.58
	Intellectual	58.2	7.37	53.2	11.58
	Activity	58.6	8.63	52.2	8.75
	Moral-Religious	64.0	4.80	58.1	10.97
	Organization	51.1	12.35	52.2	10.55
	Control	55.1	9.94	55.4	9.23
PIC*					
	Inconsistency	47.4	7.38	50.6	8.18
	Dissimulation	51.0	7.59	53.2	12.44
	Defensiveness	46.9	8.23	50.8	6.73
	Cognitive	54.3	9.39	53.4	16.70
	Impulsivity	55.0	11.66	51.4	10.15
	Delinquency	52.3	11.91	48.3	7.79
	Family Problems	46.5	4.27	48.3	5.63
	Reality Testing	50.4	8.19	52.3	14.01
	Somatic	53.3	9.03	56.8	14.52
	Psychological	55.6	10.84	58.8	14.33
	Withdrawal	45.5	6.59	52.3	8.46
	Social Skills	50.2	10.89	50.3	11.97

Note: Measures with * are reported T-scores. Total = DQOL-C Total Quality of Life; Impact = DQOL-C Impact of Diabetes; Worries = DQOL-C Worries about Diabetes; Feelings = DQOL-C Feelings about Diabetes; Interpersonal = CDI Interpersonal Problems; Negative SE = CDI Negative Self-Esteem; Anxiety/Dep. = CBCL Anxiety/Depression; Somatic = CBCL Somatic Complaints; Thought = CBCL Thought Problems; Attention = CBCL Attention Problems; Rule Breaking = CBCL Rule Breaking Behaviors; Aggressive = CBCL Aggressive Behaviors; Anxiety/Dep. = TRF Anxiety/Depression; Somatic = TRF Somatic Complaints; Thought = TRF Thought Problems; Attention = TRF Attention Problems; Rule Breaking = TRF Rule Breaking Behaviors; Aggressive = TRF Aggressive Behaviors; Achievement = FES Achievement Orientation; Intellectual = FES Intellectual-Cultural; Cognitive = PIC Cognitive Problems; Impulsivity = PIC Impulsivity and Distractibility; Somatic = PIC Somatic Complaints; Psychological = PIC Psychological Discomfort.

Table A-4

Correlation Matrix of Metabolic Control and Self, Parent, and Teacher-Report Measures

	1	2	3	4	5	6	7	8	9	10	11	12
†1. A_1C	1	.21	.31	.13	-.02	.17	-.42	-.18	-.30	.17	.11	-.12
2. RCMAS	--	1	.40**	.19	.24	.14	-.29	-.23	-.23	.68**	-.15	.22
3. CDI	--	--	1	.31*	.19	.23	-.07	-.04	-.03	-.06	-.23	-.17
4. CBCL	--	--	--	1	.81**	.82**	.10	.24	.03	-.04	-.30*	-.02
5. CBCL-I	--	--	--	--	1	.57**	.15	.28	.12	.09	-.25	.16
6. CBCL-E	--	--	--	--	--	1	.23	.25	.25	-.04	-.27*	.02
7. TRF	--	--	--	--	--	--	1	.84**	.87**	-.11	.12	--
8. TRF-I	--	--	--	--	--	--	--	1	.69**	.25	.08	--
9. TRF-E	--	--	--	--	--	--	--	--	1	.01	.23	--
†10. DQOL	--	--	--	--	--	--	--	--	--	1	.01	-.38
11. FES-C	--	--	--	--	--	--	--	--	--	--	1	.05
12. PAQ	--	--	--	--	--	--	--	--	--	--	--	1

Note: A_1C = Hemoglobin A_1C, RCMAS = Revised Children's Manifest Anxiety Scale Total Score, CDI Total = Children's Depression Inventory Total Score, CBCL = Child Behavior Checklist Total Problems Score, CBCL-I = Child Behavior Checklist Internalizing Behaviors Score, CBCL-E = Child Behavior Checklist Externalizing Behaviors Score, TRF = Teachers' Report Form Total Problems Score, TRF-I = Teachers' Report Form Internalizing Behaviors Score, TRF-E = Teachers' Report Form Externalizing Behaviors Score, DQOL = Diabetes Quality of Life Scale for Children Total Score, FES-C = Family Environment Scale Cohesion Subscale, PAQ = Parental Authority Questionnaire Authoritativeness Subscale.

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
† Correlations for these variables are based on the Diabetes group only (N = 25).

Table A-5

Analysis of Variance of the Child Behavior Checklist
for the Diabetes vs. Non-Diabetes Groups

Variable	SS	df	MS	F	p
Total Behaviors					
Between Groups	181.81	1	181.81	1.77	.189
Within Groups	5556.0	54	102.89		
Total	5737.84	55			
Internalizing Behaviors					
Between Groups	100.55	1	100.55	.82	.369
Within Groups	6612.43	54	122.45		
Total	6712.98	55			
Externalizing Behaviors					
Between Groups	352.26	1	352.26	3.93	.053
Within Groups	4845.10	54	89.72		
Total	5197.36	55			
Anxiety					
Between Groups	8.10	1	8.10	.172	.680
Within Groups	2545.74	54	47.14		
Total	2553.84	55			
Withdrawal					
Between Groups	14.53	1	14.53	.324	.571
Within Groups	2418.83	54	44.79		
Total	2433.36	55			
Somatic Complaints					
Between Groups	45.35	1	45.35	.634	.429
Within Groups	3864.63	54	71.57		
Total	3909.98	55			
Social Problems					
Between Groups	261.84	1	261.84	7.06	.010**
Within Groups	2004.15	54	37.11		
Total	2265.99	55			
Thought Problems					
Between Groups	177.43	1	177.43	5.47	.023*
Within Groups	1751.55	54	32.44		
Total	1928.98	55			
Attention Problems					
Between Groups	72.68	1	72.68	.879	.353
Within Groups	4467.04	54	82.72		
Total	4539.71	55			
Rule-breaking Behaviors					
Between Groups	115.51	1	115.51	3.57	.064
Within Groups	1746.04	54	32.33		
Total	1861.55	55			
Aggressive Behaviors					
Between Groups	229.65	1	229.65	4.33	.042*
Within Groups	2861.48	54	52.99		
Total	3091.13	55			

Note: *$\underline{p} < .05$, **$\underline{p} < .01$

Table A-6

Analysis of Variance of the Family Environment Scale
for the Diabetes vs. Non-Diabetes Groups

Variable	SS	df	MS	F	p
Cohesion					
Between Groups	.41	1	.408	.101	.923
Within Groups	2308.72	54	42.75		
Total	2309.13	55			
Expressiveness					
Between Groups	581.58	1	581.58	2.64	.110
Within Groups	11896.13	54	220.30		
Total	12477.71	55			
Conflict					
Between Groups	43.50	1	43.50	.361	.551
Within Groups	6514.72	54	120.64		
Total	6558.22	55			
Independence					
Between Groups	920.33	1	920.33	9.29	.004*
Within Groups	5347.10	54	99.02		
Total	6267.43	55			
Achievement Orientation					
Between Groups	74.08	1	74.08	1.02	.318
Within Groups	3929.48	54	72.77		
Total	4003.55	55			
Intellectual-Cultural					
Between Groups	114.58	1	114.58	1.50	.226
Within Groups	4116.77	54	76.24		
Total	4231.35	55			
Activity					
Between Groups	90.15	1	90.15	.716	.401
Within Groups	6803.21	54	125.99		
Total	6893.36	55			
Moral-Religious					
Between Groups	28.90	1	28.90	.363	.549
Within Groups	4301.10	54	79.65		
Total	4330.00	55			
Organization					
Between Groups	5.11	1	5.11	.035	.853
Within Groups	7936.73	54	146.98		
Total	7941.84	55			
Control					
Between Groups	17.97	1	17.97	.209	.650
Within Groups	4646.59	54	86.05		
Total	4664.56	55			

Note: *$\underline{p} < .01$

Table A-7

Analysis of Variance of the Personality Inventory for Children-2
for the Diabetes vs. Non-Diabetes Groups

Variable	SS	df	MS	F	p
Inconsistency					
Between Groups	78.34	1	78.34	1.78	.188
Within Groups	2382.51	54	44.12		
Total	2460.86	55			
Dissimulation (FB)					
Between Groups	175.01	1	175.01	2.52	.118
Within Groups	3748.70	54	69.42		
Total	3923.71	55			
Defensiveness					
Between Groups	245.03	1	245.03	5.21	.026*
Within Groups	2541.53	54	47.07		
Total	2786.55	55			
Cognitive Problems					
Between Groups	515.94	1	515.94	4.73	.034*
Within Groups	5888.06	54	109.04		
Total	6404.00	55			
Memory Problems (COG1)					
Between Groups	365.54	1	365.54	3.97	.051
Within Groups	4970.59	54	92.05		
Total	5336.13	55			
Behavioral Problems at School (COG2)					
Between Groups	232.27	1	232.72	2.16	.148
Within Groups	5820.71	54	107.79		
Total	6052.98	55			
Developmental Delay (COG3)					
Between Groups	165.86	1	165.86	2.00	.163
Within Groups	4476.98	54	82.91		
Total	4642.84	55			
Impulsivity and Distractibility					
Between Groups	132.50	1	132.50	1.24	.270
Within Groups	5770.86	54	106.87		
Total	5903.36	55			
Disruptive Behavior (ADH1)					
Between Groups	155.04	1	155.04	1.28	.264
Within Groups	6560.32	54	121.49		
Total	6715.36	55			
Fearlessness (ADH2)					
Between Groups	19.93	1	19.93	.188	.667
Within Groups	5736.00	54	106.22		
Total	5755.93	55			

Table A-7 Continued

Variable	SS	df	MS	F	p
Delinquency					
Between Groups	185.19	1	185.19	2.98	.090
Within Groups	3357.94	54	62.18		
Total	3543.13	55			
Antisocial Behavior (DLQ1)					
Between Groups	10.04	1	10.04	.261	.612
Within Groups	2077.68	54	38.47		
Total	2087.71	55			
Dyscontrol (DLQ2)					
Between Groups	426.43	1	426.43	7.16	.010**
Within Groups	3216.92	54	59.57		
Total	3643.35	55			
Noncompliance (DLQ3)					
Between Groups	92.26	1	92.26	1.18	.283
Within Groups	4231.30	54	78.36		
Total	4323.56	55			
Family Problems					
Between Groups	.21	1	.21	.008	.930
Within Groups	1459.50	54	27.03		
Total	1459.71	55			
Conflict Among Members (FAM1)					
Between Groups	3.71	1	3.71	.112	.739
Within Groups	1782.13	54	33.00		
Total	178.84	55			
Parent Maladjustment (FAM2)					
Between Groups	17.60	1	17.60	.450	.505
Within Groups	2110.33	54	39.08		
Total	2127.93	55			
Reality Testing					
Between Groups	251.53	1	251.53	3.42	.070
Within Groups	3974.47	54	73.60		
Total	4226.00	55			
Developmental Deviation (RTL1)					
Between Groups	164.75	1	164.75	2.45	.123
Within Groups	3625.75	54	67.14		
Total	3790.50	55			
Hallucinations and Delusions (RTL2)					
Between Groups	267.61	1	267.61	3.10	.084
Within Groups	4661.81	54	86.33		
Total	4929.42	55			

Table A-7 Continued

Variable	SS	df	MS	F	p
Somatic Complaints					
Between Groups	721.03	1	721.03	8.16	.006**
Within Groups	4772.90	54	88.39		
Total	5493.93	55			
Psychosomatic Preoccupation (SOM1)					
Between Groups	1008.25	1	1008.25	10.39	.002**
Within Groups	5239.87	54	97.04		
Total	6248.12	55			
Muscular Tension and Anxiety (SOM2)					
Between Groups	197.27	1	197.27	2.02	.161
Within Groups	5265.23	54	97.50		
Total	5462.50	55			
Psychological Discomfort					
Between Groups	634.84	1	634.84	5.09	.028*
Within Groups	6738.71	54	124.79		
Total	7373.55	55			
Fear and Worry (DIS1)					
Between Groups	277.76	1	277.76	2.17	.146
Within Groups	6910.24	54	127.97		
Total	7188.00	55			
Depression (DIS2)					
Between Groups	584.36	1	584.36	4.47	.039*
Within Groups	7064.50	54	130.82		
Total	7648.86	55			
Sleep Disturbance/Preoccupations with Death (DIS3)					
Between Groups	52.19	1	52.19	.627	.432
Within Groups	4495.94	54	83.23		
Total	4548.13	55			
Withdrawal					
Between Groups	2.36	1	2.36	.028	.869
Within Groups	4621.35	54	85.58		
Total	4623.71	55			
Social Introversion (WDL1)					
Between Groups	.23	1	.24	.002	.961
Within Groups	5311.75	54	98.37		
Total	5311.98	55			
Isolation (WDL2)					
Between Groups	28.75	1	28.75	.418	.521
Within Groups	3713.23	54	68.76		
Total	3741.98	55			

Table A-7 Continued

Variable	SS	df	MS	F	p
Social Skills					
Between Groups	20.06	1	20.06	.201	.656
Within Groups	5390.78	54	99.83		
Total	5410.84	55			
Peer Status (SSK1)					
Between Groups	258.27	1	258.27	2.97	.090
Within Groups	4693.44	54	86.92		
Total	4951.71	55			
Peer Conflict (SSK2)					
Between Groups	217.59	1	217.59	2.32	.134
Within Groups	5070.54	54	93.90		
Total	5288.13	55			

Note: *$\underline{p}$ < .05, **$\underline{p}$ < .01

Table A-8

Analysis of Variance of the Personality Inventory for Children-2
for the Good vs. Poor Metabolic Control

Variable	SS	df	MS	F	p
Inconsistency					
Between Groups	55.67	1	55.67	.901	.353
Within Groups	1297.63	21	61.79		
Total	1353.30	22			
Dissimulation (FB)					
Between Groups	.32	1	.32	.003	.958
Within Groups	2345.33	21	111.682		
Total	2345.65	22			
Defensiveness					
Between Groups	.10	1	.10	.002	.969
Within Groups	1321.20	21	62.912		
Total	1321.30	22			
Cognitive Problems					
Between Groups	14.61	1	14.61	.076	.785
Within Groups	4024.87	21	191.664		
Total	4039.48	22			
Memory Problems (COG1)					
Between Groups	.15	1	.15	.001	.974
Within Groups	2821.33	21	134.35		
Total	2821.48	22			
Behavioral Problems at School (COG2)					
Between Groups	140.44	1	140.44	1.23	.279
Within Groups	2389.48	21	113.78		
Total	2529.91	22			
Developmental Delay (COG3)					
Between Groups	1.24	1	1.24	.008	.931
Within Groups	3448.41	21	164.21		
Total	3449.65	22			
Impulsivity and Distractibility					
Between Groups	78.67	1	78.67	.603	.446
Within Groups	2738.81	21	130.42		
Total	2817.48	22			
Disruptive Behavior (ADH1)					
Between Groups	86.99	1	86.99	.597	.448
Within Groups	3060.92	21	145.76		
Total	3147.91	22			
Fearlessness (ADH2)					
Between Groups	20.41	1	20.41	.163	.690
Within Groups	3397.33	21	161.78		
Total	3423.74	22			

Table A-8 Continued

Variable	SS	df	MS	F	p
Delinquency					
Between Groups	104.14	1	104.14	.952	.340
Within Groups	2297.17	21	109.39		
Total	2401.30	22			
Antisocial Behavior (DLQ1)					
Between Groups	5.57	1	5.57	.310	.583
Within Groups	376.87	21	17.95		
Total	382.44	22			
Dyscontrol (DLQ2)					
Between Groups	57.32	1	57.32	.484	.494
Within Groups	2488.67	21	118.51		
Total	2546.00	22			
Noncompliance (DLQ3)					
Between Groups	149.24	1	149.24	1.16	.295
Within Groups	2711.63	21	129.13		
Total	2860.87	22			
Family Problems					
Between Groups	7.83	1	7 .83	.300	.590
Within Groups	547.82	21	26.09		
Total	555.65	22			
Conflict Among Members (FAM1)					
Between Groups	.71	1	.71	.025	.876
Within Groups	595.29	21	28.35		
Total	596.00	22			
Parent Maladjustment (FAM2)					
Between Groups	9.10	1	9.10	.119	.733
Within Groups	1073.73	21	51.13		
Total	1079.83	22			
Reality Testing					
Between Groups	19.59	1	19.59	.141	.711
Within Groups	2925.63	21	139.32		
Total	2945.22	22			
Developmental Deviation (RTL1)					
Between Groups	.84	1	.84	.006	.937
Within Groups	2765.08	21	131.67		
Total	2765.91	22			
Hallucinations and Delusions (RTL2)					
Between Groups	58.44	1	58.44	.411	.529
Within Groups	2987.48	21	142.26		
Total	3045.91	22			

Table A-8 Continued

Variable	SS	df	MS	F	p
Somatic Complaints					
Between Groups	150.58	1	150.58	1.05	.318
Within Groups	3021.33	21	143.87		
Total	3171.91	22			
Psychosomatic Preoccupation (SOM1)					
Between Groups	75.46	1	75.46	.447	.511
Within Groups	3544.19	21	168.77		
Total	3619.65	22			
Muscular Tension and Anxiety (SOM2)					
Between Groups	284.31	1	284.31	1.97	.175
Within Groups	3035.17	21	144.53		
Total	3319.48	22			
Psychological Discomfort					
Between Groups	50.09	1	50.09	.294	.593
Within Groups	3571.82	21	170.09		
Total	3621.91	22			
Fear and Worry (DIS1)					
Between Groups	321.20	1	321.20	2.69	.116
Within Groups	2509.23	21	119.49		
Total	2830.43	22			
Depression (DIS2)					
Between Groups	383.63	1	383.63	2.04	.168
Within Groups	3955.33	21	188.35		
Total	4338.96	22			
Sleep Disturbance/Preoccupations with Death (DIS3)					
Between Groups	31.73	1	31.73	.228	.638
Within Groups	2920.71	21	139.08		
Total	2952.44	22			
Withdrawal					
Between Groups	369.43	1	369.43	7.07	.015*
Within Groups	1097.18	21	52.25		
Total	1466.61	22			
Social Introversion (WDL1)					
Between Groups	272.71	1	272.71	3.53	.074
Within Groups	1622.59	21	77.27		
Total	1895.30	22			
Isolation (WDL2)					
Between Groups	337.13	1	337.13	6.65	.018*
Within Groups	1064.52	21	50.69		
Total	1401.65	22			

Table A-8 Continued

Variable	SS	df	MS	F	p
Social Skills					
Between Groups	358.27	1	358.27	3.03	.097
Within Groups	2485.73	21	118.37		
Total	2844.00	22			
Peer Status (SSK1)					
Between Groups	291.76	1	291.76	1.64	.080
Within Groups	1810.68	21	86.22		
Total	2102.44	22			
Peer Conflict (SSK2)					
Between Groups	236.55	1	236.55	.901	.214
Within Groups	3024.41	21	144.02		
Total	3260.96	22			

Note: *$\underline{p}$ < .05, **$\underline{p}$ < .01

Table A-9

Analysis of Variance of the Child Depression Index
for the Insulin Injection vs. Insulin Pump Groups

Variable	SS	df	MS	F	p
Total					
Between Groups	426.03	1	426.03	3.98	.058
Within Groups	2464.61	23	107.16		
Total	2890.64	24			
Negative Mood					
Between Groups	577.69	1	577.69	2.93	.101
Within Groups	4542.15	23	197.49		
Total	5119.84	24			
Interpersonal Problems					
Between Groups	216.55	1	216.55	1.67	.208
Within Groups	2973.69	23	129.29		
Total	3190.24	24			
Ineffectiveness					
Between Groups	96.67	1	96.67	1.50	.232
Within Groups	1477.97	23	64.26		
Total	1574.64	24			
Anhedonia					
Between Groups	539.85	1	539.85	5.13	.033*
Within Groups	2417.99	23	105.13		
Total	2957.84	24			
Negative Self-Esteem					
Between Groups	145.77	1	145.77	3.15	.089
Within Groups	1063.67	23	46.25		
Total	1209.44	24			

Note: *$p < .05$

Table A-10

Analysis of Variance of the Personality Inventory for Children-2
for the Insulin Injection vs. Insulin Pump Groups

Variable	SS	df	MS	F	p
Inconsistency					
Between Groups	60.81	1	60.81	1.01	.326
Within Groups	1390.15	23	60.44		
Total	1450.96	24			
Dissimulation (FB)					
Between Groups	29.29	1	29.29	.281	.601
Within Groups	2395.67	23	104.16		
Total	2424.96	24			
Defensiveness					
Between Groups	91.38	1	91.38	1.60	.218
Within Groups	1311.17	23	57.01		
Total	1402.56	24			
Cognitive Problems					
Between Groups	4.95	1	4.95	.028	.869
Within Groups	4127.69	23	179.46		
Total	4132.64	24			
Memory Problems (COG1)					
Between Groups	82.14	1	82.14	.672	.421
Within Groups	2810.90	23	122.21		
Total	2893.04	24			
Behavioral Problems at School (COG2)					
Between Groups	5.77	1	5.77	.047	.830
Within Groups	2828.23	23	122.97		
Total	2834.00	24			
Developmental Delay (COG3)					
Between Groups	48.30	1	48.30	.308	.584
Within Groups	3606.74	23	156.81		
Total	3655.04	24			
Impulsivity and Distractibility					
Between Groups	83.60	1	83.60	.695	.413
Within Groups	2765.84	23	120.25		
Total	2849.44	24			
Disruptive Behavior (ADH1)					
Between Groups	81.27	1	81.27	.600	.447
Within Groups	3117.69	23	135.55		
Total	3198.96	24			
Fearlessness (ADH2)					
Between Groups	14.16	1	14.16	.094	.762
Within Groups	3479.84	23	151.30		
Total	3494.00	24			

Table A-10 Continued

Variable	SS	df	MS	F	p
Delinquency					
Between Groups	106.67	1	106.67	1.03	.320
Within Groups	2371.33	23	103.10		
Total	2478.00	24			
Antisocial Behavior (DLQ1)					
Between Groups	26.26	1	26.26	1.67	.209
Within Groups	361.74	23	15.73		
Total	388.00	24			
Dyscontrol (DLQ2)					
Between Groups	78.70	1	78.70	.725	.403
Within Groups	2496.74	23	108.55		
Total	2575.44	24			
Noncompliance (DLQ3)					
Between Groups	164.92	1	164.92	1.35	.258
Within Groups	2818.44	23	122.54		
Total	2983.36	24			
Family Problems					
Between Groups	18.28	1	18.28	.741	.398
Within Groups	567.48	23	62.94		
Total	585.76	24			
Conflict Among Members (FAM1)					
Between Groups	35.67	1	35.67	1.37	.254
Within Groups	599.69	23	26.07		
Total	635.36	24			
Parent Maladjustment (FAM2)					
Between Groups	1.02E-03	1	1.02E-03	.000	.996
Within Groups	1105.36	23	48.06		
Total	1105.36	24			
Reality Testing					
Between Groups	21.86	1	21.86	.170	.684
Within Groups	2965.90	23	128.95		
Total	2987.76	24			
Developmental Deviation (RTL1)					
Between Groups	1.52	1	1.52	.013	.912
Within Groups	2777.84	23	120.78		
Total	2779.36	24			
Hallucinations and Delusion (RTL2)					
Between Groups	66.43	1	66.43	.498	.488
Within Groups	3068.61	23	133.42		
Total	3135.04	24			

Table A-10 Continued

Variable	SS	df	MS	F	p
Somatic Complaints					
Between Groups	73.94	1	73.94	.516	.480
Within Groups	3297.02	23	143.35		
Total	3370.96	24			
Somatic Preoccupation (SOM1)					
Between Groups	446.77	1	446.77	3.05	.094
Within Groups	3373.23	23	146.66		
Total	3820.00	24			
Muscular Tension and Anxiety (SOM2)					
Between Groups	109.00	1	109.00	.755	.394
Within Groups	3322.36	23	144.45		
Total	3431.36	24			
Psychological Discomfort					
Between Groups	64.62	1	64.62	.405	.531
Within Groups	3670.74	23	159.60		
Total	3735.36	24			
Fear and Worry (DIS1)					
Between Groups	.25	1	.25	.002	.965
Within Groups	2861.99	23	124.43		
Total	2862.24	24			
Depression (DIS2)					
Between Groups	109.34	1	109.34	.573	.457
Within Groups	4385.22	23	190.66		
Total	4494.56	24			
Sleep Disturbance/Preoccupation with Death (DIS3)					
Between Groups	160.03	1	160.03	1.30	.266
Within Groups	2833.97	23	123.22		
Total	2994.00	24			
Withdrawal					
Between Groups	288.10	1	288.10	5.07	.034*
Within Groups	1307.90	23	56.86		
Total	1596.00	24			
Social Introversion (WDL1)					
Between Groups	432.00	1	423.00	6.11	.021*
Within Groups	1625.36	23	70.67		
Total	2057.36	24			
Isolation (WDL2)					
Between Groups	9.35	1	9.35	.149	.703
Within Groups	1447.69	23	62.94		
Total	1457.04	24			

Table A-10 Continued

Variable	SS	df	MS	F	p
Social Skills					
Between Groups	6.56E-02	1	6.56E-02	.0011	.982
Within Groups	3000.97	23	130.48		
Total	3001.04	24			
Peer Status (SSK1)					
Between Groups	4.10E-03	1	4.10E-03	.000	.995
Within Groups	2217.44	23	96.41		
Total	2217.44	24			
Peer Conflict (SSK2)					
Between Groups	1.60	1	1.60	.011	.918
Within Groups	3375.84	23	146.78		
Total	3377.44	24			

Note: *$\underline{p}$ < .05

VITA

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