

Adolescents' Perspectives of Parental Practices Influence Diabetic Adherence And Quality of Life

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Diabetes is one of the most common forms of chronic illness in children and adolescents today. According to the National Diabetes Information Clearing House (2010), approximately 15,000 youth in the United States are diagnosed with type 1 diabetes each year. Type 1 diabetes is a potentially life-threatening illness. It is characterized by high blood glucose levels resulting from a destruction of the insulin-producing pancreatic cells and can lead to serious complications, such as retinopathy, nephropathy, and neuropathy, or even an early death. Adolescents, especially those in their mid- and late-teens, are particularly at risk for health complications related to poor diabetes management.

The Diabetes Control and Complications Trial (DCCT) Research Group (1993) found that the onset of complications could be significantly delayed by consistently lowering blood glucose levels to near normal. Successful medical treatment of type 1 diabetes depends not only on appropriate prescribed treatment but also on compliance with treatment. Effective management is measured by good glycemic control (reflected in

This study investigated whether perceived parental support and different parenting styles were related to adherence to diabetes management, metabolic control, and perceived quality of life of adolescents diagnosed with type 1 diabetes. Adolescents between 12 and 18 years of age ($N = 102$) diagnosed with type 1 diabetes for at least one year participated. Parents were classified into one of four groups (authoritative, authoritarian, permissive, or neglectful) based on their adolescents' surveyed perceptions of their general support and their overall responsiveness and demandingness. Perceived parental support was significantly correlated with adherence. Adolescents who perceived their parents to have authoritative parenting styles also had better adherence to their prescribed treatment plan as well as better perceived quality of life. Adolescents experience better management outcomes when adolescents and parents become interdependent by working together to achieve these outcomes.

near normal hemoglobin A1c [Hb_{A1C}] levels). Self-care management includes four to five daily events of blood glucose monitoring, insulin injections or use of an insulin pump, dietary adherence, and exercise (DCCT Research Group, 1993).

The adolescent period is a time when diabetes health management and the resultant metabolic control falter (Anderson, Auslander, Jung, Miller, & Santiago, 1990; Anderson, Ho, Brackett, Finkelstein, & Laffel, 1997; Jacobson et al., 1990; Schafer, McCaul, & Glasgow, 1986). Additionally, the phenomenon of normal insulin resistance that occurs during puberty contributes to the wide excursions in blood glucose levels (Amiel, Sherwin, Simonson, Lauritano, & Tamborlane, 1986). Researchers who study children and adolescents with diabetes have determined this population with poorly managed diabetes care had more dependency conflicts, anxiety, depression, low self-esteem, social dependency, and poor ego development compared to their healthy peers (Hauser & Pollets, 1979).

To delay or prevent serious health problems or even death, researchers and health care providers need to discover ways of helping adolescents to better manage their diabetes. In a classic study, family support was identified as highly valuable to adolescents

in terms of diabetes health management (La Greca et al., 1995). Other authors supported this and identified the types of parental support that was helpful, such as understanding, reassurance, and tangible forms of support (Hanna & Guthrie, 2001; Weinger, O'Donnell, & Ritholz, 2001).

Some studies have reported variant findings related to the benefits of parental support. While several researchers have found that having a supportive family contributes to better adherence and metabolic control (Anderson, Miller, Auslander, & Santiago, 1981; Hanson, DeGuire, Schinkel, Henggeler, & Burghen, 1992; Jacobson et al., 1994; Wysocki, 1993), other researchers have found that adolescents with very supportive families have had unremarkable or poor adherence or metabolic control outcomes (Burroughs, Pontious, & Santiago, 1993; Delahanty & Halford, 1993; Kovacs, Goldston, Obrosky, & Iyengar, 1992; Miller-Johnson et al., 1994; White, 1990). In some cases, it has not always been clear which aspects of support were studied, how support was defined, or whether positive and/or negative aspects of parental support were considered.

The purpose of this research study was to investigate if perceived parental support and perceptions of different parenting styles affect adherence to diabetes health management,

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metabolic control, and perceived quality of life for adolescents aged 12 to 18 years who were diagnosed with type 1 diabetes. Two research objectives were identified: a) to investigate the relationship between levels of perceived parental support and adolescents' adherence, metabolic control, and perceived quality of life; and b) to investigate differences in adherence, metabolic control, and perceived quality of life between adolescents who perceive their parents to have authoritative parenting styles and adolescents who perceive their parents to have authoritarian, permissive, or neglectful parenting styles. For this second objective, it was hypothesized that adolescents who perceived their parents to have an authoritative parenting style would have better adherence, metabolic control, and perceived quality of life compared to adolescents who perceived their parents to have an authoritarian, permissive, or neglectful parenting style.

Literature Review

Perceived Support

In attempting to understand how support relates to promoting health, it is important to note that supportive behavior is often a function of not only who is available to be supportive, but also how the support-receivers perceive the support offered (Cohen, Underwood, & Gottlieb, 2000). There needs to be a match between support given and how the support received is perceived. This is evidenced in the highly consistent findings that the perception of social support is most closely related to health outcomes (Cohen et al., 2000; Grey, Boland, Yu, Sullivan-Bolyai, & Tamborlane, 1998; La Greca et al., 1995; Rohrlé & Sommer, 1994). Hanna and Guthrie (2001) did a qualitative study on parents' and adolescents' perceptions of the helpful and non-helpful dimensions of support related to adolescents assuming control of their diabetes health care management. They identified that both parents and adolescents described "directive guidance" and "tangible assistance" as both helpful and non-helpful. The helpfulness of these dimensions depended on the degree of directness and the perceived need for help. Weinger et al. (2001) studied the adolescent's perception of diabetes-related parental conflict and support. They found that "parental worry" that manifested in "intrusive behaviors," "parental blaming" result-

ing from a "lack of understanding," and differences in "future" versus "present" focus between parent and adolescent were major areas of conflict (p. 334). This study suggested the need for greater understanding of the conflicts and more dialogue between parents and adolescents as it relates to diabetes health care management.

Parenting Styles

Supportive parents are seen as warm, firm, close, and nurturing. They are involved in the adolescent's life by attempting to decrease exposure to risks and encouraging protective factors. They reinforce positive family values and are often described as "authoritative" in their parenting style (Glasgow, Dornbusch, Troyer, Steinberg, & Ritter, 1997). Authoritative parents are seen as loving and democratic. They encourage adolescent autonomy by expecting and reinforcing appropriate behavior, maturity, and responsible decision-making. They encourage open communication and value the rights of both parents and the adolescent (Baumrind, 1991; Glasgow et al., 1997). Supportive parents contribute to positive development and maturation of their adolescent by being both separate from them and still connected to them. By the nature of their developmental tasks, adolescents need to emancipate themselves from their parents and form their own identities. Supportive parents facilitate their adolescent's emerging autonomy by staying involved, being firm and loving, and effectively negotiating rules, and therefore, reflecting the authoritative parent (Baumrind, 1991; Glasgow et al., 1997).

Baumrind (1971, 1991) identified three styles of parenting by categorizing parents' interactions with their children using a typology based on two dimensions of parenting: control and warmth/responsiveness. Baumrind (1991) defined "control" as employing discipline as well as providing structure, setting limits, and communicating expectations for competent, age-appropriate behavior. Baumrind (1991) (as cited in Cowan, Powell, & Cowan, 1998, p. 6) describes parents who are "warm and responsive" to their children and who provide a structure for their learning, set limits when their behavior threatens to go out of control, and set explicit standards for competent behavior as authoritative. Parents who are warm and responsive but exert little control and make few maturity demands are described as permissive. Parents who

are controlling in a cold, unresponsive way are described as authoritarian.

Building on Baumrind's early work, Maccoby and Martin (1983) further clarified that parenting style captured two important dimensions: parental responsiveness (warmth and supportiveness) and parental demandingness (behavioral control). In categorizing parents according to how high or low they were on parental demandingness and responsiveness, Maccoby and Martin (1983) added a fourth typology, that of being uninvolved or neglectful. Parents who are low in warmth and control are considered more "neglectful" in their style of parenting. Overall, adolescents whose parents have an authoritative parenting style show higher levels of competence than children raised by parents using either the permissive or authoritarian styles (Baumrind, 1991; Dornbusch, Ritter, Leiderman, Roberts, & Fraleigh, 1987).

In an article on parental involvement and adolescents with type 1 diabetes, Hanna, Juarez, Lenss, and Guthrie (2003) suggest studying parenting styles to further delineate family functioning and communication issues between parents and adolescents. In addressing family conflict and diabetes management in youth, Anderson (2004) also studied the relationship of different parenting styles to glycemic control and adherence. Anderson (2004) concedes that prior research on diabetes and general parenting characteristics, such as parental warmth and reasonable demands on the child's behavior (reflective of authoritative parenting), were related to better adherence and metabolic control. More research is needed to validate these preliminary findings and to learn how to assist parents to better negotiate their role in diabetes management with their child.

Quality of Life

Quality of life is increasingly recognized as an important factor in outcomes assessment of individuals with chronic illness (Delamater, 2000). Hence, it is important to consider quality-of-life issues in adolescents with diabetes. Diabetes imposes considerable demands on the adolescent that may interfere with his or her ability to negotiate important developmental tasks and achieve good psychosocial adjustment (Delamater, 2000). This is especially true because expectations of the adolescent to follow strict insulin regimens to attain and maintain optimal levels of glyce-

mic control and reduce risks of health complications have intensified. By studying quality of life, one can determine how a chronic illness, such as diabetes, can affect one's physical, psychological, and social functioning (Delamater, 2000).

Until recently, the impact of parenting style has not been studied in terms of how it relates to a child's sense of self or quality of life. Botello-Harbaum, Nansel, Haynie, Iannotti, and Simons-Morton (2008) found responsive parenting to positively affect the quality of life in children with type 1 diabetes age 11 to 16 years. Delamater (2000) noted that quality of life, which can be adversely affected in adolescents with type 1 diabetes, is under-studied and should be further investigated. Because of its importance as an outcome, quality of life should be routinely included in future research.

Methodology

This cross-sectional, quantitative study was carried out in a natural setting. Adolescents were included if they attended a large pediatric endocrinology clinic in West Michigan and met the inclusion criteria. Criteria for inclusion in the study included a) age 12 through 18 years; b) living with a parent; c) ability to speak or read English; d) living with a diagnosis of type 1 diabetes for at least one year; e) having a diabetes regimen that included insulin injections or the use of an insulin pump, glucose monitoring, meal planning, and exercise; and f) not having a diagnosis of any mental health issues. A convenience sample of the first 123 adolescents meeting the criteria was asked to participate in the study. Permission to conduct this study was granted from the human subject review committees of Michigan State University and the associated health care institution and the administrative office of the clinic involved.

Of the 123 subjects approached, 8 declined or changed their minds about participation citing time issues, 8 were found ineligible (after closer scrutiny), 1 withdrew after an unexpected death in the immediate family, and 4 failed to return the questionnaires. A total of 102 adolescents participated in the study.

There were 52 males and 51 females; 89% of the participants were Caucasian (almost 3% African American, 2% Hispanic, and 1% Asian American). The category of "other" was marked when an adolescent was a

blend of two or more ethnic groups. The mean age was 15 years ($SD = 1.67$). Average age at diagnosis was 7.69 years ($SD = 3.55$). Adolescents reported missing an average of 3.3 days ($SD = 4.48$) of school in the last year as a result of their diabetes.

Regarding family structure, the majority of adolescents (68.6%) lived with both biological parents. A small percentage of adolescents marked "other" for family structure. This

"other" category reflected adolescents with two involved but divorced biological parents who also had step-families. Educational levels between mothers and fathers were similar. The complete demographic/characteristic variables are included in Tables 1 and 2.

Data Collection Procedures

The staff research nurse at the pediatric endocrinology clinic helped determine which adolescents met the

Table 1.
Description of Categorical Demographic Variables (N = 102)

Sample Characteristic	Frequency (n)	Percent (%)
Gender		
Female	50	49.0
Male	52	51.0
Grade		
6	4	3.9
7	11	10.8
8	13	12.7
9	16	15.7
10	22	21.6
11	17	16.7
12	16	15.7
1 year of college	1	1.0
Missing	2	2.0
Race/Ethnicity		
Caucasian, not Hispanic	91	89.2
African American	3	2.9
Hispanic	2	2.0
Asian American	1	1.0
Other	5	4.9
Family Structure		
Two natural parents	70	68.6
Single/divorced parent	14	13.7
Step-family	9	8.8
Other	9	8.8
Father's Education Completed		
High-school or less	52	51.0
College or more	45	44.1
Missing	5	4.9
Mother's Education Completed		
High school or less	48	47.1
College or more	54	54.9

Table 2.
Description of Quantitative Demographic Variables (N = 102)

Variable	Median	Mean	SD	Range
Age	15.00	15.00	1.67	12 to 18
Age at diagnosis	8.00	7.69	3.55	1 to 15
Days of school missed	2.50	3.30	4.48	0 to 30

study criteria. Interested adolescents and parents signed informed assent and consent forms. Copies of these forms were provided for participants to take home.

To protect confidentiality, the recruiting research nurse documented each participant with an identification (ID) number. This ID number was placed on each corresponding survey and Hgb_{A1C} values documentation form. Surveys completed at the clinic were placed in a sealed envelope and returned to a special collection box. Office staff members were not able to view any of the survey responses. The majority of adolescents completed their surveys at home and did receive phone calls or mailings reminding them to return their completed surveys. Each participant was mailed \$10 upon the receipt of their completed questionnaires and was included in a drawing for four \$50 gift certificates (awarded at the completion of data collection) as an incentive to encourage the adolescents to submit completed questionnaires.

Instrumentation

In addition to the demographic variables, the variables of interest for this study included the two independent variables – perceived parental support and parenting styles – and the three outcome or dependent variables. The dependent variables included adherence to treatment plan measures, the Hb_{A1C} laboratory values, and measures reflecting the adolescents' perceived quality of life.

Adolescent perspective. Parent and adolescent reports of adherence behaviors have been highly correlated (Miller-Johnson et al., 1994). How adolescents interpret their home environment is crucial to understanding how they react or respond to it (Cohen et al., 2000; Glasgow et al., 1997; Pierce, Sarason, Sarason, Joseph, & Henderson, 1996). Additionally, in terms of parenting, Bronfenbrenner (1979) has argued that youths' perceptions of their parents' behavior may be as important as each parent's actual parenting practices. Therefore, the following (self-report) questionnaires were chosen to specifically obtain the adolescent's perspective.

Perceived parental support. Perceived parental support was assessed using the Diabetes-Specific Parental Support for Adolescents' Autonomy Scale (Hanna, DiMeglio, & Fortenberry, 2005). This scale was specifically developed to facilitate research on parental support for the adolescent's

development of diabetes management autonomy. The scale consists of four items identifying frequency of enacted support and perceived helpfulness. It also measured support dimensions of guidance (behaviors to improve performance) and nondirective support (behaviors expressing caring). The perceived parental support score reflected the combination of support scores obtained from the frequency responses of enacted support multiplied by the perceived helpfulness responses of support, as recommended by Hanna et al. (2005). (Mean = 22.79, SD = 16.75, Range = 0 to 64). According to Hanna et al. (2005), the instrument's internal consistency reliability coefficients ranged from 0.77 to 0.80. In the present study, the Cronbach's alpha was 0.71 (95% CI = 0.60 to 0.79) for the Frequency scale and 0.82 (95% CI = 0.76 to 0.87) for the Helpful subscale. Construct validity was supported by the correlation of this scale with other measures of parental support, such as the Support Subscale of the Diabetic Behavior Ratings Scale (DFBC) (Schafer et al., 1986) and Guidance/Control and Total Scale of the DFBC (Hanna et al., 2005; McKelvey et al., 1993).

Parenting styles. Parenting styles were measured using the Parenting Style Index – II (PSI-II) (Darling & Toyokawa, 1997). The PSI-II consists of the three subscales (responsiveness, autonomy-granting, and demandingness) with five items each. According to Darling and Toyokawa (1997), each subscale showed acceptable alpha levels (responsiveness = 0.74; autonomy-granting = 0.75; demandingness = 0.72). In the present study, the alpha levels were responsiveness = 0.71 (95% CI = 0.61 to 0.79) and demandingness = 0.64 (95% CI = 0.51 to 0.74). The autonomy-granting subscale was not analyzed in the present study. Inter-correlations were also reported (responsiveness: demandingness – $r = .34$; responsiveness: autonomy-granting – $r = 0.46$; and demandingness: autonomy-granting – $r = -0.11$). Validity was also measured using correlation coefficients to show the relationship between positive parenting and adolescent outcomes, parenting practices, and perceived authority. These values were in the expected magnitude and direction (Darling & Toyokawa, 1997).

As suggested by Darling and Toyokawa (1997) and Maccoby and Martin (1983), and consistent with the literature, two of the three subscales (responsiveness and demand-

ingness) were used to categorize parenting into four styles of parenting (authoritative, authoritarian, permissive, and neglectful). The measures for both mother and father in the same household were averaged. According to Baumrind (1991), there is significant similarity between the adolescents' perceived mothers' and fathers' ratings. Data in this study supported this as well.

Adherence. Adherence was measured using the Diabetic Behavior Rating Scale (DBRS) (Cook, Aikens, Berry, & McNabb, 2001; McNabb, Quinn, Murphy, Thorp, & Cook 1994). The DBRS, a more recent version of the Children's Diabetic Inventory, roughly assesses the degree of responsibility assumed by the adolescent related to 39 diabetes self-management behaviors and the frequency with which these are performed. These behaviors include daily prevention activities, activities related to modification of the diabetes care plan, intervention behaviors (such as those related to illness), and activities to maintain diabetes care supplies. Additionally, these behaviors assess the four areas of adherence that are considered important by the American Diabetes Association: diet, exercise, glucose testing, and insulin administration. Both responsibility behaviors and their frequency are rated on a 5-point scale (5 = adolescent totally responsible to 1 = parent totally responsible; and 5 = always to 1 = never). Cronbach's alpha was reported to be 0.86 for the behavioral frequency items and 0.94 for the degree of responsibility items (McNabb et al., 1994). The Cronbach's alpha for this study was 0.85 (95% CI = 0.81 to 0.89) for the frequency items and 0.95 (95% CI = 0.93 to 0.96) for responsibility items. A panel of experts assessed content validity. Construct validity was supported from the findings of children's overall level of diabetes self-care responsibility behaviors significantly correlating with age (McNabb et al., 1994). In this study, adherence was based on the sum of frequencies of self-management behaviors. Missing values were imputed based on mean scores from items in the same section.

Metabolic control. Metabolic control is routinely measured during clinic visits by obtaining a capillary blood sample and measuring the adolescent's Hb_{A1C}. The Hb_{A1C} is a value that reflects the level of serum glucose over the preceding six to eight weeks as the glucose molecule attaches itself to the red blood cell for the life of the

red blood cell. It is considered the best indicator of metabolic control during the preceding two to three months. The capillary sample is collected by trained personnel and analyzed by a certified hospital-based laboratory. To control for skewed values that may occur during the honeymoon phase (defined as the period in which the pancreas still produces small amounts of insulin, post-diagnosis [American Diabetes Association, 2010]), metabolic control was determined based on the average of the last four Hb_{A1C} values over the last year or since the adolescent came out of the honeymoon phase. The patient's last four documented values were recorded from the adolescent's medical record by the nurse or physician. These values were then averaged to determine the Hb_{A1C} values (Mean = 8.40, SD = 1.10, Range = 6.3 to 12%). The American Diabetes Association (2006) recommends the goal for Hb_{A1C} values to be in the range of 6% to 7%.

Quality of life. Quality of life was measured by the Diabetes Quality of Life for Youth Scale (DQOLY) (Ingersoll & Marrero, 1991). This instrument is an adaptation of the Diabetes Quality of Life measure (adult version) developed specifically to assess the psychosocial impact of the intense diabetes treatment regimens for participants in the DCCT. In the "youth's version" of the scale, items of little relevance to adolescents and children were omitted or modified. A panel of pediatric diabetes experts verified the content validity of the resulting items. The revised instrument with a 5-point Likert-scale contains 3 subscales. The first is a 26-item Diabetes Impact Scale that rates the impact of diabetes on life from 1 (no impact) to 5 (always affected). The second is a 13-item Diabetes-Related Worries Scale that rates worries related to diabetes from 1 (never worried) to 5 (always worried). The third is a 17-item Diabetes Life Satisfaction Scale that rates satisfaction with diabetes from 1 (very satisfied) to 5 (never satisfied). Following the three subscales, the authors included a general rating scale of overall health (utilizing a 4-point scale, 1 = poor to 4 = excellent). In this study, quality of life was analyzed using the summation of each of these sub categories (impact, worry, and satisfaction). Missing values were imputed based on mean scores from items in the same subcategory. Cronbach's alpha scores of the Diabetes Impact Scale, the Diabetes-Related Worries Scale, and the Diabetic Life Sati-

Table 3.
Parenting Style Groupings Based on the K-Means Cluster Analysis (N = 102)

Variable	n	Responsiveness		Demandingness	
		Mean	SD	Mean	SD
Authoritative	37	21.99	1.99	21.18	1.83
Authoritarian	16	14.91	3.07	21.59	1.17
Permissive	45	18.63	1.68	17.30	1.72
Neglectful	4	12.75	3.01	14.88	3.33

sfaction Scale were reported to be 0.83, 0.82, and 0.85, respectively (Ingersoll & Marrero, 1991). In the present study, the Cronbach's alpha scores were 0.87 (95% CI = 0.83 to 0.90), 0.92 (95% CI = 0.89 to 0.94), and 0.91 (95% CI = 0.88 to 0.93), respectively.

Data Analysis

Perceived parental support. To first investigate the relationships between the adolescent's perceived level of parental support and the dependent variables (adherence, metabolic control, and quality of life), correlational analyses were conducted. Based on the nature of the ordinal data, the Spearman's rank order correlation coefficient was used.

Parenting styles. In preparation for analyses, each parenting style was identified using the K-means cluster analysis. This method was used to create the ideal parenting style groups. Based on the responsiveness and demandingness scores, parenting styles were grouped to display small within-cluster variations, and large between-cluster variations (Kachigan, 1991). Parenting styles that reflected high demandingness and high responsiveness scores were used to create the authoritative group; parenting styles that reflected low responsiveness but high demandingness were used to create the authoritarian group; parenting styles that reflected high responsiveness but low demandingness were used to create the permissive group; and parenting styles that reflected low responsiveness and low demandingness were used to create the neglectful group. Table 3 presents the responsiveness and demandingness means and standard deviations that were used to create each of the four parenting cluster groups.

Since data related to parenting style were categorical, an analyses of variance (ANOVA) was performed to evaluate the differences between parenting style groups (authoritative,

Table 4.
Spearman's Rho Correlation Coefficient Values of Adolescents' Perceived Level of Parental Support and the Dependent Variables (N = 102)

Variables	Perceived Parental Support	
	rs	p
Adherence	0.375	0.000
Average Hb _{A1C}	-0.146	0.144
Quality of life		
Impact	-0.101	0.313
Worry	-0.033	0.741
Satisfaction	0.233	0.018

authoritarian, permissive, and neglectful) on the dependent variables (adherence, metabolic control, and quality of life). To determine if assumptions for statistical tests were met, Levene's Tests for Equality of Variances were run, and when appropriate, non-parametric analyses were also completed. To determine which groups demonstrated the differences, a post-hoc analysis was run using the Least Significant Difference (LSD) test.

Results

Perceived Parental Support

Table 4 displays the correlations among the adolescents' perceived level of parental support and the measures of diabetes adherence, metabolic control, and quality of life. A significant positive relationship was found between each adolescent's perceived level of parental support and adherence to a prescribed treatment plan ($r_s = 0.375, p = 0.000$). As the perceived level of parental support increased, so did the adolescent's adherence to a prescribed treatment

Table 5.
K-Mean Clusters Analysis and Summary of Significant ANOVAs, Non-Parametric Tests, and Least Squares Differences Represented by *p* Values (*N* = 102)

Variables	ANOVA	Non-Parametric	Authoritative/Authoritarian		Authoritative/Permissive		Authoritative/Neglective
			LSD	Non-Parametric	LSD	Non-Parametric	LSD
Adherence Frequency	0.006		0.024		0.013		0.013
Quality of Life							
Impact		0.038 ^a		0.020 ^b		0.034 ^b	
Worry	0.025		0.003				
Satisfaction						0.030 ^b	

^aKruskal-Wallis

^bMann-Whitney

plan. No significant relationship was found between perceived parental support and metabolic control. However, a non-significant negative trend was noted. Where there were higher levels of perceived parental support, the Hb_{A1C} tended to be lower.

Quality of life, as assessed through the Diabetes Impact subscale and the Diabetes-Related Worries subscale, did not show a relationship with parental support. However, the analyses of parental support and the Diabetic Life Satisfaction subscale for quality of life demonstrated a significant relationship ($r_s = 0.233, p = 0.018$).

Parenting Styles

Adherence. Using the K-means cluster groupings, the one-way ANOVA showed a significant difference in adherence means between the authoritative parenting style group and each of the authoritarian, permissive, and neglectful parenting style groups. These results are summarized in Table 5. The post-hoc LSD analysis demonstrated a significant difference in adherence between the adolescents perceiving their parents as authoritative and those perceiving their parents as authoritarian, permissive, or neglectful in parenting style.

Metabolic control. There were no differences in metabolic control (mean Hb_{A1C} values) between adolescents who perceive their parents to have authoritative parenting styles and adolescents who perceived their parents to have authoritarian, permissive, or neglectful parenting styles.

Quality of life. The analysis for quality of life was based on the three subscales for quality of life: impact, worry, and satisfaction. Unequal variances with quality-of-life Diabetes Impact scores prompted researchers

to run non-parametric tests. First the Kruskal-Wallis test revealed a significant difference between quality-of-life Diabetes Impact scores and other variable means. The Mann-Whitney test was used to determine the significance of quality-of-life Diabetes Impact scores with respect to the difference in the adolescents' perception of authoritative and other parenting styles. Table 5 presents these results. Quality-of-life Diabetes Impact scores were found to be significantly different between adolescents perceiving their parents having authoritative and authoritarian parenting styles ($Z = -2.318, p = 0.020$) and between the authoritative and permissive parenting styles ($Z = -2.117, p = 0.034$).

For quality-of-life Diabetes Worry scores, the one-way ANOVA analysis demonstrated a significant difference between the means ($F [3, 98] = 3.25, p = 0.025$). Using the LSD analysis on the quality-of-life Diabetes Worry scores, there was a significant difference between the adolescents perceiving their parents as authoritative in their parenting style and the adolescents perceiving their parents as authoritarian in their parenting style (LSD = $-7.615, p = 0.003$). No significant differences relating to quality-of-life Diabetes Satisfaction scores and the adolescents' perception of their parents' with the differing parenting styles were found.

Discussion

This study found that perceived parental support and authoritative parenting styles affect adolescents' ability to positively manage their diabetes health care as well as favorably influence their quality of life. The first research objective was to investigate

the relationship between perceived levels of parental support and adolescents' adherence measures, metabolic control, and perceived quality of life.

Perceived Parental Support

Adherence. The analyses showed a significant relationship between perceived parental support and adolescents' adherence with their diabetes health management. This supports the findings of other researchers that a relationship exists between supportive behaviors of parents and adherence measures of adolescents with diabetes (Burroughs, Harris, Pontious, & Santiago 1997). Adolescents' diabetes management is better when parents are involved, responsive, and caring (Anderson et al., 1997; Burroughs et al., 1993; Hanna & Guthrie, 2001; Hanson, Henggeler, Burghen, 1987a, 1987b; Kyngas & Rissanen, 2001).

Metabolic control. There was no relationship found between perceived parental support and metabolic control. Other researchers have also failed to find a relationship between positive and encouraging parental support and metabolic control (Hanson et al., 1992; Schafer, Glasgow, McCaul, & Dreher, 1983). Hanson et al. (1987a) demonstrated a direct effect between adherence and metabolic control. This study showed a significant relationship between perceived parental support and adherence; thus, one might expect to also see a relationship between perceived parental support and metabolic control. However, this was not the case. Most likely, there are other factors involved that affect metabolic control that were not accounted for in this study. It is still interesting to note, as stated earlier, that a negative trend in the

relationship between perceived parental support and metabolic control was found. As perceived parental support scores increased, there was a non-significant trend for the average Hb_{A1C} to decrease. It is possible that a statistically significant relationship might be seen with a larger sample.

Quality of life. Perceived parental support was positively correlated with quality of life as measured through satisfaction. This was consistent with what has been found in the literature. Grey et al. (1998) reported that adolescents who were more satisfied with their quality of life perceived their families as more supportive (warm and caring). Adolescents who were more satisfied with their quality of life reported fewer symptoms of depression and found coping with diabetes easier and less upsetting. In the current study, adolescents were fairly positive about their diabetes overall. They expressed low to moderate impact and worry about their diabetes and moderate satisfaction related to their quality of life.

Perceived parental support, although correlated with quality of life as measured through satisfaction, did not correlate with quality of life as measured through impact or worry. Grey et al. (1998) also reported that family functioning was not significantly correlated with quality of life. This same study found some adolescents reporting diabetes as having a large impact on their life. Adolescents who typically reported more impact were more likely to see the management of diabetes as harder and more upsetting. Further, adolescents who worried more had more symptoms of depression and found coping with diabetes more difficult. It would seem that adolescents who see their diabetes management as harder or more difficult to cope with might tend to respond differently to behaviors expressing caring or parental support measures related to diabetes care. Other factors, such as the stress of diabetes or even the stress of adolescence, may be intervening.

Parenting Style

The second research objective was to investigate differences in adherence measures, metabolic control, and perceived quality of life between adolescents who perceive their parents to have authoritative parenting styles and adolescents who perceive their parents to have authoritarian, permissive, or neglectful parenting styles. It is important to note that this categorization of parenting

styles was purely heuristic – for research purposes only – and was not meant to diagnose any certain parenting style group. The parenting style typology was meant to describe normal variations in parenting and was not intended to identify deviant parenting practices, such as seen in neglectful homes (Darling, n.d.).

Adherence. Although many researchers investigating parental support studied certain characteristics of parenting styles, such as warmth and control, no previous studies focused on parenting style typologies exclusively with adolescents adhering to their diabetes treatment plan. Adolescents who perceived their parents to have authoritative parenting styles had better adherence to their prescribed treatment plan than adolescents who perceived their parents to have authoritarian or permissive parenting styles. This was an anticipated finding based on the social support literature addressing parenting style. Family cohesion is often associated with better adherence, whereas family conflict is associated with poorer adherence (Hanson, DeGuire, Schinkel, & Kolterman 1995; Miller-Johnson et al., 1994). Characteristics of the authoritative parent can influence adherence in a number of ways. Authoritative parenting can foster a positive family milieu resulting in reduced family conflict and/or an increase in family cohesion. These children are usually happier, exhibit higher self-esteem, and perform better socially and academically. Social competence has also been associated with better adherence (Hanson et al., 1987b).

Metabolic control. No differences in metabolic control (Hb_{A1C}) between adolescents who perceived their parents to have authoritative parenting styles and adolescents who perceived their parents to have authoritarian, permissive, or neglectful parenting styles were found. This is consistent with the result that there was no relationship between perceived parental support and metabolic control, and was an expected finding. As discussed previously, metabolic control seems to be associated with other factors, such as stress. Hanson et al. (1987b) indicated that stress was directly associated with metabolic control and that “the interaction between parental support and stress did not buffer the negative effects of stress” (p. 532).

Quality of life. Based on one or more of three measures of quality of life (impact, worry, or satisfaction),

adolescents who perceived their parents to have authoritative parenting styles had better perceived quality of life than adolescents who perceived their parents to have authoritarian or permissive parenting styles. These findings were in contrast to analyses between perceived parental support and quality of life, which only found satisfaction to be significantly correlated with parental support. This may be explained because the tools are measuring different dimensions of the parent-child experience. The parental support questionnaire focused on enacted support related to diabetes management with an element of caring. The parenting style questionnaire focused on the “emotional climate in which particular parent-child interactions occur” (Darling & Toyokawa, 1997, p. 2). It would be expected that perceptions of quality of life would be higher in an environment characterized by warmth, involvement, high expectations, and gentle guidance such as seen with an authoritative parenting style.

Limitations

One limitation of this study was sample size. Although the sample size was large enough to determine significance for some analyses, it may have lacked adequate power to detect an effect for parenting style groups’ sub-analyses. A larger sample size would have been desirable to assure greater numbers of participants in each parenting style group. For example, there were only four subjects in the neglectful parenting style group. The lack of significant findings in this group was most likely related to the lack of power due to the small sample size. It may also explain why no significant differences were found in all but one analysis involving that group. Additionally, the convenience sample may not be representative of the entire population of adolescents with type 1 diabetes, thereby affecting the generalizability of this study. Finally, there was very little ethnic diversity. It would be helpful to obtain national, state, or countywide registries of adolescents with diabetes to determine actual ethnic demographics. Ideally, sample populations could be drawn from more than one geographic location to assure better diversity within the groups.

Implications for Practice And Research

As responsibility for diabetes health care management transitions from parent to child from late child-

hood through adolescence, parents need to be made aware of the crucial role they play in fostering good diabetes health care management. Positive parental support was positively correlated with adherence. Parental support has also been associated with better quality of life. These findings have implications for clinical practice. Research has shown that adolescents need acceptance, genuine interest, motivation, encouragement, and positive feedback (Anderson et al., 1997; Kyngas & Rissanen, 2001; LaGreca et al. 1995). Health care providers are in a position to share the significance of parental support with parents of adolescents with diabetes and to help parents distinguish helpful involvement from more intrusive involvement. According to Grey et al. (1998), the challenge is to find "parental involvement that is individualized for the adolescent, without risking poorer control from over-involvement or under-involvement" (p. 913). The emphasis should be on the adolescent. Practitioners must recognize that adolescents are worried about their future health and may need help in attempting to balance these concerns with other developmentally appropriate tasks of adolescence (Farro, 1999). Practitioners and parents need to understand the experience of the adolescent with diabetes to help determine the appropriate support, family environment, and parenting activities that would foster good diabetes health management.

Authoritative parenting styles can have positive outcomes for adolescents with type 1 diabetes in terms of adherence and quality of life. To better understand the influence of the authoritative parent on an adolescent with diabetes and his or her diabetes health management, more research is needed to further explore the milieu, relationships, and interactions between the parent and child/adolescent. Qualitative studies of adolescents with authoritative parents may give better insight into the environment, interactions, day-to-day challenges, and strategies related to the management of type 1 diabetes that contribute to better outcomes. Additionally, as adolescents become more capable of self-management, the emphasis should be on interdependence. Parents need to remain involved. "Focusing on autonomy of the adolescent and facilitating interdependence between parent and adolescents is an important direction for research" (Anderson, 2001, p. 649).

Differences in the developmental

phases of early, middle, and late adolescents have long been recognized. Replicating this study with a larger sample size would enable a further and possibly more insightful analysis of differences in adolescent responses according to early, middle, and late adolescents. It would also be important to look further into how adolescent perceptions of support and parental practices influence later adherence, metabolic control, and quality of life once the adolescent becomes a young adult. Finally, this study has the potential for further research and application for adolescents with other kinds of chronic diseases.

Conclusion

Successful management of type 1 diabetes in adolescents remains a challenge. Research has shown that adolescents experience better outcomes related to management when parents remain involved. The new theoretical focus for adolescents with diabetes is to move from "independence to interdependence" (Anderson, 2001). Parents who are perceived to be supportive and authoritative in their parenting style seem to promote a sense of interdependence as they encourage and promote adolescent autonomy. Parents should be warm and responsive to their adolescent's needs, especially health care needs, and provide appropriate structure and guidance. They need to encourage adolescent autonomy by expecting and reinforcing appropriate behavior, maturity, and responsible decision-making. When this occurs through authoritative parenting practices, youth of all ages may experience more support, less stress, and in turn, feel better about themselves and their quality of life. More research is needed regarding how parents can nurture the development of more autonomous individuals to facilitate better health care outcomes for adolescents with type 1 diabetes. Metabolic control may not be the only outcome variable to measure good diabetes health. Quality of life is important, and it can be fostered by good parenting.

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