Parent and Adolescent Versions of the Diabetes-Specific Parental Support for Adolescents' Autonomy Scale: Development and Initial Testing

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Objective To develop and initially test the psychometric properties of parent and adolescent versions of the Diabetes-Specific Parental Support for Adolescents' Autonomy Scale. **Methods** Data-based scale items were developed, analyzed for content validity, and then piloted with 43 adolescents with type 1 diabetes and their parents. Psychometric properties of the scales were then determined with 100 adolescents with type 1 diabetes and their parents. **Results** Content validity indices of .80 or greater were obtained for 26 items. Item analysis in the pilot and large-sample groups resulted in 22 items being deleted. Principal Components Analysis of the remaining four items indicated one factor in both parent and adolescent versions, accounting for 50–62% of variance and with Cronbach alpha coefficients of .67–.80. **Conclusions** This newly developed parsimonious scale, initially tested to be reliable, and valid, will facilitate research on parental support for adolescents' development of diabetes management autonomy.

Key words diabetes; adolescents; autonomy; parental support.

Approximately 123,000 children and adolescents in the United States have type 1 diabetes (U.S. Department of Health and Human Services, 1997). Over time, this disorder places them at risk of developing of retinopathy, nephropathy, neuropathy, and cardiovascular disease (American Diabetes Association, 1998). Maintenance of strict metabolic control by optimizing management through blood sugar testing, dietary monitoring, and insulin administration is essential for reducing the likelihood of these serious health consequences (Diabetes Control and Complications Research Group, 1994). Unfortunately, adolescents have substantially more problems with diabetes management than do school-age children or adults (Anderson, Auslander, Jung, Miller, & Santiago, 1990; Miller-Johnson et al., 1994; Wysocki, Hough, Ward, Allen, & Murgai, 1992), with most problems occurring in mid-adolescence. For example, the mean age of onset for lack of management to diabetes regimen is 14.8 years (Kovacs, Goldston, Obrosky, & Iyengar, 1992) and hospital readmissions for ketoacidosis, hypoglycemia, or poor control most commonly occur between 14 and 15 years of age (Glasgow et al., 1991).

A major factor that contributes to the failure of adolescents to achieve good control is the difficult yet necessary process of transferring diabetes management responsibilities from parents to adolescents, with adolescents' development of autonomy in diabetes management being an essential element in this complex process. Adolescent autonomy is a major aspect of adolescent psychosocial development which occurs within relationships with parents (Steinberg, 1990)—adolescents seek autonomy (Bosma et al., 1996; Smetana, 1989; Wierson, Nousiainen, Forehand, & Thomas, 1992), whereas parents provide adolescents more autonomy (Youniss &

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Smollar, 1985). This general autonomy is related to autonomy specific to illness conditions (Drotar & Ievers, 1994). Consistent with this fact is the finding that adolescents increase their autonomy in performing diabetes management (Anderson et al., 1990; Drotar & Ievers, 1994; La Greca, Follansbee, & Skyler, 1990; McNabb, Quinn, Murphy, Thorp, & Cook, 1994), whereas parents decrease their involvement (Anderson, Ho, Brackett, Finkelstein, & Laffel, 1997; Ingersoll, Orr, Herrold, & Golden, 1986). Further, adolescents' autonomy, as measured by self-reliance, partially mediates maternal involvement in diabetes management (Palmer et al., 2004).

For many, the transfer of diabetes management responsibility from parents to adolescents is unsuccessful, influencing diabetes management and subsequently metabolic control. For example, when parental involvement decreases, adolescent involvement does not necessarily increase (Ingersoll et al., 1986), with poor metabolic control during times when neither parent nor adolescent is responsible for diabetes management (Anderson et al., 1990). When parents transfer responsibilities before adolescents' developmental readiness, poor diabetes management occurs (Wysocki et al., 1996). When parents do not agree about responsibility, parent–adolescent conflict can occur, leading to poor diabetes management (Hanson, DeGuire, Schinkel, & Kolterman, 1995; Hauser et al., 1990; Pendley et al., 2002; Schafer, Glasgow, McCaul, & Dreher, 1983; Stewart et al., 2000; Wysocki, Hough, Ward, Allen, & Murgai, 1992) and metabolic control (Anderson, Miller, Auslander, & Santiago, 1981; Hanson et al., 1995; Marteau, Bloch, & Baum, 1987; McKelvey et al., 1989; Pendley et al., 2002).

Owing to difficulties in the transfer of diabetes management responsibilities, greater parental involvement in diabetes management as a means toward achieving better metabolic control is advocated (Anderson, Brackett, Ho, & Laffel, 1999). However, if parents are over-involved, they do not allow adolescents to develop competence as autonomous persons (Kronenberger & Thompson, 1990; Lawler, Volk, Viviani, & Mengel, 1990; Seiffge-Krenke, 1998). Adolescence is a transitional period where children are expected to become competent self-governing adults (Steinberg, 1990), with behavioral autonomy being considered to be both independent functioning and decision-making (Sessa & Steinberg, 1991). Thus, adolescents need to do more than become more independent in overtly performing diabetes management; they need to develop competence. However, there are very few specific recommendations about how parents can promote development of diabetes management competence in their adolescents (and remain involved to maintain metabolic control). Provision of support that encourages development of responsible adult autonomy is one way that parents can actively promote such competence. Specifically, to develop competence, adolescents need parents to support their autonomy (Steinberg & Morris, 2001), with strategies that include reasoning, discussing, advising, and supervising but not strict control (Baumrind, 1991). When parents use such strategies, adolescents develop positively (Baumrind, 1996; Steinberg & Morris, 2001) in academic abilities (Bronstein et al., 1996; Lamborn, Mounts, Steinberg, & Dornbusch, 1991), psychosocial maturity (Bronstein et al., 1996; Jackson, Bijstra, Oostra, & Bosman, 1998; Lamborn et al., 1991), and overall competence (Baumrind, 1991; Jackson et al., 1998).

Most of the existing diabetes-specific family support scales do not directly measure the dimension of autonomy-promoting support. The Diabetes Family Behavior Checklist (DFBC) (Schafer et al., 1983; Schafer, McCaul, & Glasgow, 1986) has subscales measuring supportive and unsupportive behaviors but does not measure autonomy-promoting support. The Diabetes Social Support Questionnaire—Family Version (La Greca & Bearman, 2002) has subscales measuring various aspects of the diabetes regimen (insulin, glucose monitoring, meals, and exercise) but not any specific dimensions of support except for emotional support. Only a few scales measure constructs similar to autonomy-promoting support. The Guidance and Control Subscale of the Diabetes Family Behavior Scale (DFBS) (McKelvey et al., 1993) purports to measure parental support behavior; however, some items measure feelings rather than behaviors. The Diabetes Social Support Interview (La Greca et al., 1995) does measure informational support, often defined as "communications of opinion or feedback" (Thoits, 1985, p. 53), yet does not specifically measure support that encourages autonomy development. A diabetes-specific scale that directly measures parental provision of support that facilitates adolescents' development of autonomy is needed.

Additionally, it would be beneficial to have parallel parent and adolescent versions of a diabetes-specific scale measuring parental promotion of autonomy. Providers and recipients of support often do not have similar views of what is helpful (Hupcey, 1998). There is the potential that perceptions of too much help will intimidate the receiver's freedom, ultimately decreasing self-esteem (Newsom & Schulz, 1998). This is important for adolescents because overprotective parents inhibit their development of general autonomy (Holmbeck et al., 2002) and diabetes management autonomy (Anderson

& Coyne, 1991). Parents attempting to provide support must be sensitive to the adolescents' need to develop this autonomy. Parallel versions of a diabetes-specific autonomy-promoting support scale for parents and adolescents could highlight incongruities between parents as providers and adolescents as recipients of this type of support, as well as serve as a guide for counseling. However, of the available diabetes scales, only the DFBC (Schafer et al., 1983, 1986), which does not measure autonomy-promoting support, has parallel versions that measure both parents' and adolescents' perspectives.

There is currently no available diabetes-specific scale that measures parental support that promotes adolescents' development of autonomy and has parallel versions to measure both parents' and adolescents' viewpoints. This study was designed to develop valid and reliable parent and adolescent versions of a diabetes-specific scale that measures parental support for promoting adolescents' autonomy.

Methods

This study was conducted in three phases. Phase 1 consisted of item development, including determination of content validity. Phase 2 piloted the scale with a sample of adolescents with type 1 diabetes and their parents. Phase 3 tested the scale for psychometric properties with a second, larger sample of adolescents with type 1 diabetes and their parents.

Phase 1: Development of Items

Parallel versions of a diabetes-specific parental autonomy-promoting support scale for parents and adolescents were developed based upon qualitative data about parents' and adolescents' perspectives of what parental behaviors were helpful and nonhelpful to adolescents' assumption of diabetes management responsibilities (Hanna & Guthrie, 2001). Item categories were based on Barrera and Ainlay's (1983) social support dimensions of guidance (behaviors to improve performance), nondirective support (behaviors expressing caring), and tangible assistance (behaviors to provide instrumental assistance). Guidance items indicated the presence or absence of parental support for adolescents' development of autonomy in diabetes management. For example, in some items, parents discussed and reasoned with adolescents (presence), and in other items, parents gave commands to adolescents (absence). The use of reasoning and discussion to facilitate development of autonomy was based upon adolescent theory and empirical findings (Baumrind, 1991; Steinberg & Morris, 2001) and upon a previous qualitative study where adolescents with type 1 diabetes and their parents gave descriptions of guidance and tangible assistance as helpful or nonhelpful, depending on the degree of directness, which could range from giving commands to discussing (Hanna & Guthrie, 2001). Items were written for the each aspect of the diabetes regimen [glucose monitoring, insulin administration (injection or pump), diet, and exercise as well as miscellaneous behaviors such as paying for and keeping records]. Items were designed to be appropriate for both adolescents and parents, with an attempt to use a minimum of negative words. The initial scale consisted of 40 items, which are delineated in Table I.

As suggested by Grant and Davis (1997), content validity of both parent and adolescent versions of the scales was assessed with a panel of 10 experts in adolescent care, diabetes, and chronic illness. The experts were recruited from a pediatric and adolescent diabetes team (six nurses, physicians, dietitians and social workers) at a regional children's hospital in the Midwest and from a group of four doctorally prepared U.S. nurse experts in diabetes, chronic conditions, and adolescents. The experts reviewed the 40 support items for relevance to the a priori categories of guidance, nondirective support, and tangible assistance. Content validity indexes were calculated on the basis of the experts' agreement about item relevance. Items with a content validity index of .80 or greater were retained, leaving 26 items (Table I).

Phase 2: Piloting the Parallel Versions

Participants

The scale was then piloted with a sample of 43 pairs of adolescents with type 1 diabetes and their parents. Adolescents were included if they had been diagnosed before 10 years of age and had a regimen that included glucose monitoring, insulin administration (either injection or pump), exercise, and meal planning. Parents were all living with the adolescents and were the primary caretakers involved in diabetes management. Parent–adolescent dyads were excluded from the study if one member did not speak English or had any obvious mental or physical health problems that could interfere with performing diabetes management tasks. Participants were asked whether they were behind peers in grade in school, had vision problems, or had arthritis that would interfere with tasks such as seeing, drawing up, or giving insulin. The adolescents ranged in age from 12.1 to 18.9 years (M = 14.6, SD = 1.9). Most of (83%) the adolescents were Caucasian, and 58% of them were female. This sample had a higher proportion of females than the general population of children and adolescents with

Table I. Examples of Items and Decision Points for Deletion at Each Phase Of Study

Directive guidance—varying degrees	Phase 1	Phase 2	Phase 3
Told rather than reminded to check glucose		Deleted	
First reminded and then demanded check glucose		Deleted	
Asked if checked glucose		Deleted	
Joked about rather than telling to check glucose	Deleted		
Allowed to go with friends if checked glucose	Deleted		
Told to give insulin			Deleted
Reminded give insulin before chance to do it	Deleted		
Suggested give insulin before telling to do it			
Checked make sure giving insulin	Deleted		
Allowed go places with friends if gave insulin	Deleted		
Showed how figure insulin even if knows how			Deleted
Made figure insulin dose so that learns			Deleted
Showed how to figure insulin dose			
Asked what thinks needs to be done about insulin			
Answered questions about figuring insulin dose			
Told to exercise			Deleted
Reminded about exercising			Deleted
Talked with teen about why needs to exercise			Deleted
Told what foods to eat			Deleted
Asked if had enough food	Deleted		
Talked with teen about food choices			Deleted
Checked to make sure keeping log book	Deleted		
Told to be responsible for supplies	Deleted		
Nondirective support			
Was around when needed help with high or low blood sugar			Deleted
Let know can calculate insulin		Deleted	
Made it easy to give insulin, so it is not a hassle			Deleted
Told that proud of him/her		Deleted	
Made sure that others know about diabetes so don't seem different		Deleted	
Gave teen big hugs	Deleted		
Did not make a big deal out of checking glucose	Deleted		
Tangible assistance or lack of			
Helped teen with checking glucose		Deleted	
Let teen check glucose	Deleted		
Gave insulin when teen did not feel like doing it		Deleted	
Let teen give insulin	Deleted		
Made sure had calories was suppose to have	Deleted		
Refilled supplies		Deleted	
Paid for prescriptions		Deleted	
Had an account at drugstore for teen	Deleted		
Kept the log books		Deleted	
Paid for the supplies		Deleted	

type 1 diabetes, which occurs about equally between males and females (National Institutes of Health, 1995). This sample followed the predominately Caucasian racial distribution noted in the general population of children and adolescent with type 1 diabetes (Diabetes in America, 1995) and the medical center's population (T. Poitoff, personal communication, November 27, 2000). The mean hemoglobin A1c (DCA, 2000, Bayer, Tarrytown, NY) was 9.4% (*SD* = 1.8), ranging from 6.2 to 13.7%, and the mean duration of diagnosis with diabetes was 5.1 years (*SD* = 3.3), ranging from 1 to 12 years. Most (72%) were administering insulin via injections; the remainder were using insulin pumps. Most of the parents who participated were mothers (91%) with at least a high-school education (95%), with 53% having had education beyond high school (9% associate, 9% vocational, 14% bachelor, 19% masters, and 2% doctoral degrees).

Measures

Parental Support Parental support was measured with two separate scales (the first for enacted support and the second for perceived helpfulness), each having the same 26 items representing the dimensions of guidance (15), nondirective support (5), and tangible assistance (6) for the various aspects of the diabetes regimen. Guidance and tangible assistance items reflected varying degrees of directness, from parents giving commands to using discussions and reasoning. With the first scale, parents and adolescents were asked to report how often parental support behaviors had occurred in the past 3 months. Potential responses were on a scale from "none of the time" (1) to "all of the time" (5). Then, with the second scale, parents and adolescents were then asked to rate the helpfulness of parental support, with potential responses ranging from "not at all helpful" (1) to "very helpful" (5). The items were appropriately phrased for parents' and adolescents' versions of the scale.

Procedure

The study was conducted after approval from the University's Institutional Review Board and after permission from the appropriate personnel at a regional medical center for the outpatient Pediatric/Adolescent Diabetes Service who hold clinics 5 days of the week. Parent–adolescent dyads were enrolled in the study at appointments for diabetes care. Clinic personnel approached potential participants about their interest in participating in the study. Then, data collectors approached potential participants to explain the study, to screen them according to inclusion and exclusion criteria, and to obtain voluntary written consents from parents and adolescents, 18 years of age and older, and assents from adolescents under 18 years of age. Participants were asked to complete the instruments in a private room while waiting for appointments. The primary investigator and research assistants (masters students in nursing) collected data according to the data collection protocol (delineating explanation of study, screening for inclusion and exclusion criteria, obtaining consents, and collecting data in private room). Each parent and adolescent dyad received a $10 phone card for their time and effort.

Results

Items were analyzed, as suggested by Ferketich (1991), for low or high interitem correlations (<.30 or >.70), for item to total correlations (>.30), for increased alpha coefficients if the items were deleted, and for skewness of 1.0 or greater. Item analysis was conducted with a list-wise deletion of missing data. On the basis of item analysis, 12 items were deleted from the support scale, leaving 14 items. See Table I for delineation of which items were deleted. The remaining items predominately reflected the dimension of directive guidance, with two items reflecting nondirective support and no items reflecting tangible assistance. The Cronbach alphas ranged from .83 to .91 for the parents' and adolescents' versions of the scales measuring enacted support and perceived helpfulness of support. Participants suggested that the two separate scales (first for frequency of enacted support and second for perceived helpfulness of support) should be combined into one scale.

Phase 3. Testing for Psychometric Properties

Participants

The psychometric properties of the scale were initially tested with a sample of 100 adolescents with type 1 diabetes and their parents. The sample size for initial testing was primarily chosen for logistical reasons; with 100 subjects, the scale can be refined before further testing. There is considerable divergence in what is considered a sufficient sample size for factor analysis (MacCallum, Widaman, Zhang, & Hong, 1999), with a sample size of 200 considered adequate by some (Comrey, 1988), whereas others consider that 10 subjects per item is needed (Kerlinger, 1986). A sample size of 100 is questionably adequate if all the 14 items had remained in the factor analysis. However, after item analysis (described below), there were only four items remaining for factor analysis in this phase of the study. Considerably smaller samples are adequate on the basis of high commonalities and overdetermination of factors (MacCallum et al., 1999). In this sample, the commonalities ranged from .5 to .7 for the various parent and adolescent versions of the scales, with commonalities of .6 and above considered high (MacCallum et al., 1999). Further, there is a recommendation of about 5 variables to 1 factor (MacCallum et al., 1999), with 4 variables to 1 factor in this study. To further determine the adequacy of sample, the researchers performed Kaiser–Meyer–Olkin tests. Kaiser–Meyer–Olkin values ranged from .680 to .759 for the various adolescent and parent versions, indicating an adequate sample for factor analysis (Tabachnick & Fidell, 1989). In addition, Bartlett tests of sphericity were performed and yielded values of 101.5, $p < .000$, for frequency of enacted, 47.7, $p < .000$, for perceived helpfulness, and 92.053, $p = .000$, for combined (frequency by helpfulness) parent versions and were 99.8, $p < .000$, for frequency of enacted, 99.2, $p < .000$, for perceived helpfulness, and 104.791, $p = .000$, for combined (frequency by helpfulness) adolescent versions.

These values indicated that the correlations did not happen by chance and that there was justification for factor analysis (Tabachnick & Fidell, 1989).

The same outpatient Pediatric/Adolescent Diabetes Service setting as well as the same inclusion and exclusion criterion were used as in the pilot-testing phase. An additional exclusion criteria was added: parent–adolescent dyads who had participated in Phase 2 of the study were not enrolled in Phase 3. Of the 153 pairs of adolescents and parents who met study criteria, 105 (69%) voluntarily consented to participate in the study. The most frequent reason given for declining to participate was lack of time. Five pairs did not complete the questionnaires because they left the clinic before completing questionnaires, were unable to read English (although verbally stating they did in the screening), or the adolescent became hypoglycemic.

Adolescents ranged in age from 12.1 to 18.5 years (*M* = 14.8, *SD* = 1.6), and the average duration since the diabetes diagnosis was 5.6 years (*SD* = 3.4), ranging from 1 to 15 years. Sixty percent of the adolescents were male; 91% were Caucasian. This sample had a higher proportion of males than the general population of children and adolescents with type 1 diabetes, which occurs about equally between males and females (Diabetes in America, 1995). This sample's predominately Caucasian distribution follows the medical center's population (T. Poitoff, personal communication, November 27, 2000). Type 1 diabetes in children and adolescents was once considered to be predominately a disease of Caucasians in the United States (Diabetes in America, 1995); however, recent reports reflect great ethnic variation globally (Karvonen et al., 2000) and an increasing incidence of diabetes (types 1 and 2 combined) among African-Americans for various geographic regions in the United States (Libman et al., 1998; Oeltman, Addy, Liese, Mayer-Davis, & Heinze, 2003). Adolescents' hemoglobin A1c mean was 9.03% (*SD* = 1.6), ranging from 5.6 to 14.1% for clinic visit at enrollment, and was 8.9% (*SD* = 1.5), ranging from 5.3 to 13.4% at clinic visit 3 months before enrollment. Of the adolescents, 81% lived with two parents. Most parents who participated were Caucasian (93%), were mothers (80%), and had had a high-school education (97%), with 50% having had at least some college education. Income of parents ranged from $10,000 or less to greater than $100,000, with the most frequent response (32%) between $40,000 and $60,000.

Measures

Parental Support Scale The 14-item scale being tested measured support dimensions of guidance (behaviors to improve performance) and nondirective support (behaviors expressing caring) for the various aspects of the diabetes regimen. Guidance items were stated to reflect the degree of autonomy support, from parents giving commands (absence) to using discussions (presence). On the basis of feedback from participants in Phase 2 of the study, the dimensions of enacted support and perceived helpfulness of support were combined into a single scale. (See Table II for an example item.) Adolescents and parents were first asked to note how often parental support behavior occurred (frequency of enacted support), from "none of the time" (0) to "all of the time" (4). Then, adolescents and parents were asked to note how helpful parental support (perceived helpfulness) was, from "not at all helpful" (0) to "very helpful" (4). Adolescents and parents were asked to respond on the basis of their interactions during the past 3 months. In addition, adolescents and parents were instructed to consider "giving insulin" to refer to either injection or pump administration of insulin. The scale provided frequency of enacted support (sum of responses for frequency items), perceived helpfulness of support (sum of responses for helpfulness items), or combined support (frequency responses multiplied by helpfulness responses and then summed) scores.

Sociodemographic and Diabetes Background Questions Adolescents were asked about gender, race, and education level. Parents were asked questions about age, gender, race, education, and income. Charts were reviewed for birthdates, diagnosis dates, and the current and most recent past hemoglobin A1c levels.

The Diabetes Family Behavior Checklist The parent and adolescent versions of this scale consisted of 14 items, measuring enacted supportive and nonsupportive behaviors for diet, glucose monitoring, insulin administration, and exercise (Schafer et al., 1986). Participants were asked

Table II. Example of Enacted Support and Perceived Helpfulness Item Combined into 1 Instrument

	How often have you:					How helpful was it when you:				
In the past 3 months	None of the time				All of the time	Not at all helpful				Very helpful
Asked him or her "what do you think needs to be done about your insulin."	0	1	2	3	4	0	1	2	3	4

to note the frequency of behaviors on a 5-point scale from 1 ("never") to 5 ("at least once a day"). Construct validity has been supported by the relation between family support and diabetes management (Hanson, DeGuire, Schinkel, & Henggeler, 1992; Hanson, Henggeler, & Burghen, 1987; La Greca et al., 1995). Reliability has been reported to be from .63 to .73 for the supportive and .43 to .60 for unsupportive subscales with adolescent and adult samples (Schafer et al., 1986). The low reliability for unsupportive subscale (Schafer et al., 1986) involved two items that lowered the Cronbach alpha. These two items were deleted from the scale in this study. The resulting Cronbach alpha values were .85 and .80 for supportive and .82 and .74 for unsupportive subscales for adolescents and parents, respectively.

The Diabetes Family Behavior Scale This 47-item scale measured adolescents' view of parental support for the dimensions of warmth/caring, guidance/control, and total support related to meals, glucose testing, insulin administration, exercise, supplies, and communication with health care professionals (McKelvey et al., 1993). For this study, a parallel parent version was constructed, rewording items to be appropriate for parents as providers of support. Adolescents and parents were asked to note how often the behaviors occurred, from "all the time" (1) to "never" (5). Construct validity has been supported in past studies, with better metabolic control related to the total score (McKelvey et al., 1993) and guidance subscale (Grey, Davidson, Boland, & Tamborlane, 2001; McKelvey et al., 1993). McKelvey et al. (1993) reported alpha values of .86 for the total scale, .81 for guidance/control, and .79 for warmth/caring subscales. In this study, Cronbach alpha values were .72 and .61 for the guidance/control subscales, .77 and .43 for the warmth/caring subscales, and .83 and .74 for the total support scales for adolescents and parents, respectively.

Diabetes Responsibility Scale Adolescents' diabetes responsibility and parental involvement were measured with the responsibility subscale of the Diabetes Responsibility and Conflict Scale (Peyrot, Steinberg, Rubin & Young-Hyman, unpublished data; Rubin, Young-Hyman, & Peyrot, 1989). The subscale consists of 15 items, measuring the degree that the adolescent and/or parent are responsible for insulin administration, glucose monitoring, meals, exercise, and discussion of diabetes with others. Parents and adolescents were asked to note who handles the tasks at home, with potential responses from (0) "child all the time" to (4) "parent all the time," with a "2" response reflecting parent half and child half. Adolescents' responses were recoded so that a score of 4 reflected adolescent all the time. Cronbach alphas of .79 for adolescents and for parents were reported by Peyrot et al. (unpublished data), and in this study, the Cronbach alpha value was .82 for adolescents and .81 for parents.

Procedure

Approval from the University's Institutional Review Board and permission by the appropriate personnel at a regional medical center for the outpatient Pediatric/Adolescent Diabetes Service was obtained. Recruitment of participants and procedures were the same in Phase 3 of the study as in Phase 2.

Results

Before data analysis, data were examined for outliers, with none being noted, and for missing data. Most of the missing data (missing data ranged from 0 to 5 adolescents missing and 0 to 10 parents missing on individual items) were on perceived helpfulness. It appears that this was related to the combined instrument, where enacted and perceived helpfulness sections were combined as suggested by participants in Phase 2. However, in Phase 3, participants completed the first section on frequency of enacted support but sometimes missed items on the second section of perceived helpfulness. Missing data were handled differently for different analyses. For item and factor analysis, there was a list-wise deletion of missing data. In computing the final summed scores for the various scales consisting of at least 14 items, missing data were imputed when participants missed less than 40% of items. For the scales consisting of only four items, missing values were imputed only when just one item was missed. Missing values were imputed by computing the mean for the answered items for each individual. After missing values were imputed, descriptive statistics were performed for the various scales or checklists (Table III).

Item Analysis

Item analysis was conducted for the parent and adolescent versions of the frequency of enacted support, perceived helpfulness of support, and the combined frequency by helpfulness of support scales. Again, item analysis was conducted according to the methods of Ferketich (1991); items were analyzed for low (<.30) or high (>.70) interitem correlations, item to total correlations (<.30), skewness of 1.0 or greater, and an increased alpha coefficient if the item was deleted. Ten items were deleted from the total of 14 items on the basis of a problem with one or more of these

Table III. Means, Standard Deviations, and Ranges of Scales

Scales	Actual (range)	Parents Range	Parents *M* (*SD*)	Adolescents Range	Adolescents *M* (*SD*)
Parental Support for Autonomy					
Frequency	0–16	0–16	8.02 (4.4)	0–16	8.6 (4.6)
Helpfulness	0–16	0–16	8.7 (4.2)	0–16	9.1 (4.9)
Combined frequency/helpfulness	0–64	0–64	23.6 (17.1)	0–64	27.9 (19.3)
Diabetes Responsibility	0–60	NA	NA	18–60	44.2 (7.9)
Parental Involvement	0–60	0–50	21.8 (8.1)	NA	NA
DFBC					
Supportive	9–45	10–39	24.5 (6.5)	9–45	24.1 (8.3)
Unsupportive	5–25	5–25	11.5 (4.4)	5–25	11.1 (5.3)
DFBS					
Total	47–235	127–192	166 (12.8)	119–196	159 (18.0)
Warmth	15–75	43–69	58.3 (4.5)	35–70	56.5 (8.3)
Guidance and control	15–75	25–56	41.1 (6.0)	25–66	40.6 (7.7)

DFBC = Diabetes Family Behavior Checklist; DFBS = Diabetes Family Behavior Scale.

parameters. See Table I for delineation of which items were deleted.

Factor Analysis

Principal Component Analysis was performed on the frequency of enacted support, the perceived helpfulness of support, and the combined frequency by helpfulness of support scales for both the adolescent and parent versions. The presence of one factor was indicated by the scree test and only one factor with eigenvalue greater than 1 for all versions. The loadings ranged between .699 and .854 for parent and adolescent versions. The one factor accounted for between 50 and 62% of variance for parent and adolescent versions. The items reflect guidance that facilitates autonomy hence the labeling the Diabetes-Specific Parental Support for Adolescents' Autonomy Scale. Cronbach alphas ranged between .67 and .80 for the various parent and adolescent versions. See Tables IV and V for delineation of eigenvalues, percentage of variance accounted for, Cronbach alphas, and item loadings for parent and adolescent versions.

A scale reading level of 6.2 was calculated according to the Flesch–Kincaid grade level via Microsoft Word (Microsoft, 2000). When reading level was calculated without the words "diabetes," "insulin," "injection," and "responsibility," the grade level was 4.8. These words were retained, however, because it was decided that they would be familiar to this particular population.

Pearson correlations were performed to determine relations between the Diabetes-Specific Parental Support for Adolescents' Autonomy Scales (Frequency, Helpfulness, and Combined) and similar parental support measures (Table VI). Construct validity was supported by significant correlations between the Diabetes-Specific Parental Support for Adolescents' Autonomy Scale and the Supportive Subscale of the DFBC (Schafer et al., 1983, 1986) and the Guidance/Control Subscale and Total Scale of the DFBS (McKelvey et al., 1993) for both parents and adolescents and with the Warmth/Caring Subscale of the DFBS (McKelvey et al., 1993) for parents. Appropriately, the Parental Support for Adolescents' Autonomy Scale was not correlated with the Unsupportive Subscale of the DFBC (Schafer et al., 1983, 1986).

Pearson correlations were performed to determine relations between the Diabetes-Specific Parental Support for Adolescents' Autonomy Scale (frequency, helpfulness, and combined frequency by helpfulness scores) and age, adolescents' diabetes management responsibil-

Table IV. Parents' and Adolescents' Versions of Autonomy Support Scale

	Frequency		Helpfulness		Combined	
	Parents	Teens	Parents	Teens	Parents	Teens
Eigenvalues	2.372	2.417	2.020	2.399	2.429	2.486
Percentage of variance accounted for	59	60	50	60	61	62
Cronbach alpha values	.77	.78	.67	.77	.78	.80

Table V. Loadings for One-Factor Solution: Parents' and Adolescents' Versions of Autonomy Support Scale

Items	Parents	Adolescents
Frequency of enacted support		
Asked "what do you think needs to be done about your insulin."	.763	.704
Showed how to figure insulin dose.	.769	.772
Suggested that give insulin before telling to do it.	.756	.792
Answered questions about figuring insulin dose.	.791	.836
Perceived helpfulness of support		
Asked "what do you think needs to be done about your insulin."	.697	.679
Showed how to figure insulin dose.	.778	.855
Suggested that give insulin before telling to do it.	.686	.732
Answered questions about figuring insulin dose.	.677	.819
Combined support: frequency by helpfulness		
Asked "what do you think needs to be done about your insulin."	.699	.761
Showed how to figure insulin dose.	.854	.815
Suggested that give insulin before telling to do it.	.817	.766
Answered questions about figuring insulin dose.	.738	.809

Table VI. Pearson Correlations: Relation of Autonomy Support with Other Diabetes Support Scales

	Frequency		Helpfulness		Combined	
Support scales	Parents	Teens	Parents	Teens	Parents	Teens
DFBC—unsupportive	.20*	.27*	.01	.12	.01	.14
DFBC—supportive	.56**	.54**	.50**	.43**	.53**	.46**
DFBS—guidance/control	.42**	.41**	.43**	.40**	.40**	.36**
DFBS—warmth	.25*	.12	.19	.10	.28*	.15
DFBS—total	.51**	.39**	.48**	.40**	.50**	.41**

*$p \leq .05$.
**$p \leq .01$.

ity, and parents' involvement in diabetes management. It is difficult to predict relations between parental support for autonomy support and other variables as there is a paucity of studies in this area. It could be expected that as adolescents age, they achieve a certain degree of autonomy and would need less parental support for autonomy. As noted earlier, older adolescents have more autonomy or independence in performing diabetes management than younger ones (Anderson et al., 1990; Drotar & Ievers, 1994; La Greca et al., 1990; McNabb et al., 1994). Consistent with this expectation was the finding that, as adolescents increased in age, less parental support for adolescents' autonomy in frequency, $r = -.35$, $df = 98$, $p = .000$, perceived helpfulness, $r = -.40$, $df = 97$, $p = .000$, and combined, $r = -.46$, $df = 94$, $p = .000$, scores were reported by adolescents. Likewise, as adolescents increased in age, less parental support for adolescents' autonomy in frequency, $r = -.31$, $df = 99$, $p = .002$, perceived helpfulness, $r = -.36$, $df = 93$, $p = .000$, and combined, $r = -.32$, $df = 91$, $p = .002$, support scores were reported by parents.

As parental involvement can be considered a dimension of support (tangible assistance), it could be expected that support for autonomy would be related to other dimensions of support. Indeed, parental involvement in diabetes management was correlated with parental support for adolescents' autonomy in frequency, $r = .50$, $df = 99$, $p = .000$, perceived helpfulness, $r = .45$, $df = 93$, $p = .000$, and combined, $r = .45$, $df = 91$, $p = .000$, support scores as reported by parents. It could be expected that the opposite relation would be found for adolescents as when parental involvement (doing diabetes management tasks) increases, adolescents' diabetes responsibility decreases. It could also be expected that less parental support for adolescents' autonomy would be needed as adolescents assumed more responsibility. Indeed, less parental support for their autonomy in frequency, $r = -.35$, $df = 97$, $p = .000$, perceived helpfulness, $r = -.34$, $df = 96$, $p = .000$, and combined, $r = -.35$, $df = 93$, $p = .001$, support scores were reported by adolescents as their diabetes management responsibility increased.

An area of clinical interest is the relation between parental support for autonomy and hemoglobin A1c. However, as parental support for autonomy would most likely indirectly influence metabolic control, a significant relation may not be seen. In this study, hemoglobin A1c was not significantly related to parental support for autonomy as reported by adolescents or by parents. Hemoglobin A1c was not significantly correlated with parental support for adolescents' autonomy in frequency, $r = .16$, $df = 99$, $p = .124$, perceived helpfulness, $r = .02$, $df = 93$, $p = .821$, and combined, $r = .06$, $df = 91$, $p = .573$, support scores. Hemoglobin A1c was not significantly correlated with adolescents' report of parental support for their autonomy in frequency, $r = .17$, $df = 98$, $p = .104$, perceived helpfulness, $r = .02$, $df = 93$, $p = .821$, and combined, $r = .11$, $df = 94$, $p = .288$, support scores.

Discussion

In this initial testing, this new Diabetes-Specific Parental Support for Autonomy Scale, with parent and adolescent versions, has acceptable psychometric properties. Principal Components Analysis yielded one factor that reflects parental support facilitating adolescents' development of autonomy. The items reflect parental behaviors of reasoning and discussing with adolescents, which are important behaviors for adolescents' development of autonomy (Baumrind, 1991; Steinberg & Morris, 2001). Interestingly, only support behaviors specific to insulin administration remain in this scale, although the development phase included other major aspects of the regimen. It could be speculated that all other aspects converge on insulin administration. For example, insulin adjustments are made with consideration of glucose monitoring, meals eaten, and exercise. In addition, insulin administration reflects a more complex skill for which adolescents need more support. A considerable amount of variance (50–62%) was accounted for by one factor in various versions. The loadings ranged between .67 and .85, which is considered very good to excellent (Tabachnick & Fidell, 1989). The various scale versions have good internal consistency reliability coefficients, ranging between .77 and .80, except for the minimally acceptable .67 value for the parents' perceived helpfulness version. Furthermore, the scale with four items is parsimonious, which is important for use with adolescents. Construct validity was supported by the relation of The Diabetes-Specific Parental Support for Adolescents' Autonomy Scale with other measures of parental support, specifically the Supportive Subscale of the DFBC (Schafer et al., 1983, 1986) and the Guidance/Control and Total Scale of the DFBC (McKelvey et al., 1993).

Construct validity was further supported by the relation of The Diabetes-Specific Parental Support for Adolescents' Autonomy Scale with age, parental involvement, and adolescents' diabetes management responsibility. As adolescents increased in age, parents' and adolescents' reported parental support for their autonomy decreased. This is as expected because with increasing age, adolescents' generally increase their overall autonomy (Bosma et al., 1996) as well as independence in performing diabetes management (Anderson et al., 1990; Drotar & Ievers, 1994; McNabb et al., 1994), whereas parents decrease their level of involvement in diabetes management (Anderson et al., 1997; Drotar & Ievers, 1994; Drozda, Allen, Standiford, Turner, & McGain, 1997). Adolescents who have achieved a certain level of autonomy in diabetes management probably do not need to still receive support for autonomy from their parents. Parents' report of their support for autonomy was correlated with parental involvement in diabetes management. Parental involvement, which can be considered tangible assistance, a dimension of support, would be expected to be related to another dimension of support. However, one could also speculate that as parents provide more support for autonomy, parents would be less involved and thus one could expect a negative correlation between parental involvement and support. This points out the need to further study this complex parent–adolescent relationship.

Other relations are also difficult to infer as there is a paucity of studies in this area. Adolescents' report of parental support for autonomy was negatively correlated with their diabetes management responsibility. It is difficult to infer what this relation means in a cross-sectional study. Adolescents who are not yet responsible need more support from their parents. Alternatively, parents who are more involved in providing support, even autonomy support, may not be allowing their adolescents to become autonomous in diabetes management. Parental over-involvement has been reported to be detrimental to adolescents' development of autonomy (Holmbeck et al., 2002). Another possibility is that the Diabetes Responsibility Scale (Peyrot et al., unpublished data; Rubin et al., 1989) is not truly measuring responsibility. The scale predominately asks who performs the tasks; however, a mature responsible adolescent may not actually perform a task but still be responsible for making sure it is completed. For example, an adolescent may ask a parent to check his or her glucose on a Saturday morning because the adolescent wants to sleep in. With the

Diabetes Responsibility Scale (Peyrot et al., unpublished data; Rubin et al., 1989), it would not be possible to score those adolescents who engage in such behavior as being responsible when actually they are responsible. Other forms of autonomy such as decision making may be more indicative of responsibility; better metabolic control has been reported among adolescents who were more autonomous in their decision making about diabetes management (Hanna & Guthrie, 2003).

Another area that is difficult to infer is the lack of relationship between metabolic control and parental support for autonomy. The lack of a significant relationship in this study is similar to findings in another study of the lack of relationship between adolescents' diabetes specific autonomy in performance of diabetes tasks and metabolic control (Dashiff, 2003). This lack of relationship with metabolic control is not totally surprising as the relation between diabetes management and metabolic control is less than perfect (Johnson, 1994) and the added dimension of parental support for autonomy is part of the complexity that needs to be further explored. The need for further exploration is evident in the confusing findings noted on the relation between family support, diabetes management, and metabolic control (Burroughs, Harris, Pontious, & Santiago, 1997). For example, better diabetes management was associated with greater levels of supportive behaviors (Hanson et al., 1987; McCaul, Glasgow, & Schafer, 1987; Schafer et al., 1986) and nonsupportive behaviors in many studies (Burroughs, Pontious, & Santiago, 1993; McCaul et al., 1987; Schafer et al., 1986; Skinner & Hampson, 1998); however, nonsupportive behavior was related to worse diabetes management in other studies (Hanson et al., 1992; Schafer et al., 1983). The association of support to metabolic control is just as confusing, with better metabolic control related to support in some studies (Grey et al., 2001; McKelvey et al., 1989, 1993; Schafer et al., 1986; Weist, Finney, Barnard, Davis, & Ollendick, 1993) but not in another study (Pendley et al., 2002). Further, the complexity of this process was noted in findings in another study; when children or adolescents have low levels of general autonomy, high levels of maternal involvement in diabetes management was needed for better metabolic control (Palmer et al., 2004). Further studies are needed to tease out other mediators and moderators in this complex process between parents and adolescents. For example, parent–adolescent conflict negatively impacts diabetes management (Hanson et al., 1995; Hauser et al., 1990; Pendley et al., 2002; Stewart et al., 2000; Wysocki, Hough, Ward, Allen, & Murgai, 1992) and metabolic control (Hanson et al., 1995; Pendley et al., 2002); perhaps incongruity between adolescents' autonomy assertion and parental support for autonomy leads to conflict which subsequently influences diabetes management and metabolic control.

Limitations of the study need to be considered. This study reports the initial testing of the scale, and further testing with larger samples from other geographic regions, representing various ethnic groups, is needed. Testing psychometric properties is suggested with a larger sample size or one with all high commonalities (>.6) and a 5-variable-to-one-factor ratio is recommended by MacCallum et al. (1999). This sample with limited ethnic diversity may be different from other geographic regions with diverse ethnic representations of adolescents with type 1 diabetes and their parents.

The sample may also not be representative of adolescents with type 1 diabetes and their parents in ways other than ethnic distribution. The adolescents, on average, in this sample had relatively good metabolic control, which could impact responses to parental autonomy scale. The parents were relatively well educated, which is another way that the sample was not representative. In addition, there may be self-selection bias with adolescents and parents who were in fairly good relationships willing to participate in this study and those who were in difficult relationships might not have been willing to answer questions about their relationships.

The Diabetes-Specific Parental Support for Adolescents' Autonomy Scale provides a brief, valid, and reliable means to assess how parents are involved in adolescents' diabetes management. As noted by experts (Anderson et al., 1997), parental involvement is important for the maintenance of metabolic control during early adolescence. However, the ways in which parents are involved, specifically encouragement of autonomy, are very important for adolescents' development of diabetes management competence. It is essential that adolescents take over diabetes management responsibility because they will eventually need those skills when they leave their parents' homes. Clinically, parental support for autonomy (use of reasoning, discussing, etc.) is an important area to assess and, when appropriate, use as a basis for counseling.

Further research is needed on how parents can best be involved in diabetes management to facilitate adolescents' development of competence. The transfer of diabetes management responsibility from parents to adolescents is a complex process. Parent–adolescent relationship variables, including parental support for autonomy, that influence adolescents' development of competence need to be further examined, teasing out variables that indirectly and directly influence metabolic control. To better understand this complex process, researchers need to conduct a longitudinal study that examines changes in parent–adolescent relationship variables, including support and responsibility for diabetes management, from the perspectives of both adolescents with type 1 diabetes and their parents.

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References

American Diabetes Association. (1998). Standards for medical care for patients with diabetes mellitus. *Diabetes Care*, *21*, S23–S31.

Anderson, B. J., Auslander, W., Jung, K., Miller, P., & Santiago, J. (1990). Assessing family sharing of diabetes responsibilities. *Journal of Pediatric Psychology*, *15*, 477–492.

Anderson, B. J., Brackett, J. B., Ho, J. B., & Laffel, M. B. (1999). An office-based intervention to maintain parent–adolescent teamwork in diabetes management: Impact on parent involvement, family conflict, and subsequent glycemic control. *Diabetes Care*, *22*, 713–712.

Anderson, B. J., & Coyne, J. C. (1991). "Miscarried Helping" in the families of children and adolescents with chronic diseases. In J. H. Johnson & S. B. Johnson (Eds.), *Advances in child health psychology* (pp. 167–177). Gainesville, FL: University of Florida Press.

Anderson, B. J., Ho, J., Brackett, J., Finkelstein, D., & Laffel, L. (1997). Parental involvement in diabetes management tasks: Relationships to blood glucose monitoring management and metabolic control in young adolescents with insulin-dependent diabetes mellitus. *Journal of Pediatrics*, *130*, 713–721.

Anderson, B. J., Miller, J. P., Auslander, W. F., & Santiago, J. V. (1981). Family characteristics of diabetic adolescents: Relation to metabolic control. *Diabetes Care*, *4*, 586–593.

Barrera, M., & Ainlay, S. (1983). The structure of social support: A conceptual and empirical analysis. *Journal of Community Psychology*, *11*, 133–143.

Baumrind, D. (1991). Effective parenting during the early adolescent transition. In P. Cowan & M. Hetherington (Eds.), *Family transitions* (pp. 111–163). Hillside, NJ: Lawrence Erlbaum.

Baumrind, D. (1996). The discipline controversy revisited. *Family Relations*, *45*, 405–414.

Bosma, H., Jackson, S., Zijsling, D., Zani, B., Cicognani, E., Xerri, M., et al. (1996). Who has the final say? Decisions on adolescent behavior with the family. *Journal of Adolescence*, *19*, 277–291.

Bronstein, P., Duncan, P., D'Ari, A., Pieniadz, J., Fitzgerald, M., Abrams, C., et al. (1996). Family and parenting behaviors predicting middle school adjustment: A longitudinal study. *Family Relations*, *45*, 415–426.

Burroughs, R., Harris, M., Pontious, S., & Santiago, J. (1997). Research on social support in adolescents with IDDM: A critical review. *Diabetes Educator*, *23*, 438–448.

Burroughs, R., Pontious, S., & Santiago, J. (1993). The relationship among six psychosocial domains, age, health care adherence, and metabolic control in adolescents with IDDM. *Diabetes Educator*, *19*, 396–402.

Centers for Disease Control and Prevention. *National Diabetes Fact Sheet: 1997* U.S. Department of Health and Human Services. Atlanta, GA.

Comrey, A. (1988). Factor-analytic methods of scale development in personality and clinical psychology. *Journal of Consulting and Clinical Psychology*, *56*, 754–761.

Dashiff, C. J. (2003). Self- and dependent-care responsibility of adolescents with IDDM and their parents. *Journal of Family Nursing*, *9*, 166–183.

Diabetes Control and Complications Research Group. (1994). Effect of intensive diabetes treatment on the development and progression of long-term complications in adolescents with insulin-dependent diabetes mellitus: Diabetes control and complications trial. *Journal of Pediatrics*, *125*, 177–188.

Drotar, D., & Ievers, C. (1994). Age differences in parent and child responsibilities for management of cystic fibrosis and insulin-dependent diabetes mellitus. *Developmental and Behavioral Pediatrics*, *15*, 265–272.

Drozda, D. J., Allen, S. R., Standiford, D. A., Turner, A. M., & McGain, G. C. (1997). Personal illness models of diabetes: Parents of preadolescents and adolescents. *The Diabetes Educator*, *23*, 550–557.

Ferketich, S. (1991). Aspects of item analysis. *Research in Nursing & Health*, *14*, 165–168.

Glasgow, A. M., Weissberg-Benchell, J., Tynan, W. D., Epstein, S. F., Driscoll, C., Turek, J., et al. (1991). Readmissions of children with diabetes mellitus to a children's hospital. *Pediatrics*, *88*, 98–104.

Grant, J., & Davis, L. (1997). Selection and use of content experts for instrument development. *Research in Nursing & Health*, *20*, 269–274.

Grey, M., Davidson, M., Boland, E. A., & Tamborlane, W. V. (2001). Clinical and psychosocial factors associated with achievement of treatment goals in adolescents with diabetes mellitus. *Journal of Adolescent Health*, *28*, 377–385.

Hanna, K., & Guthrie, D. (2001). Parents and adolescents' perceptions of helpful and nonhelpful support for adolescents' assumption of diabetes management responsibility. *Issues in Comprehensive Pediatric Nursing*, *24*, 209–223.

Hanna, K., & Guthrie, D. (2003). Adolescents' behavioral autonomy related to diabetes management and adolescent activities/rules. *Diabetes Educator*, *29*, 283–291.

Hanson, C. L., DeGuire, M. J., Schinkel, A. M., & Henggeler, S. W. (1992). Comparing social learning and family systems correlates of adaptation in youths with IDDM. *Journal of Pediatric Psychology*, *17*, 555–572.

Hanson, C. L., DeGuire, M. J., Schinkel, A. M., & Kolterman, O. G. (1995). Empirical validation for a family-centered model of care. *Diabetes Care*, *18*, 1347–1356.

Hanson, C. L., Henggeler, S. W., & Burghen, G. A. (1987). Social competence and parental support as mediators of the link between stress and metabolic control in adolescents with insulin-dependent diabetes mellitus. *Journal of Consulting and Clinical Psychology*, *55*, 529–533.

Hauser, S. T., Jacobson, A. M., Lavori, P., Wolfsdorf, J. I., Herskowitz, R. D., Milley, J. E., et al. (1990). Adherence among children and adolescents with insulin-dependent diabetes mellitus over a four-year longitudinal follow-up. II. Immediate and long-term linkages with the family milieu. *Diabetes Spectrum*, *4*, 282–292.

Holmbeck, G. N., Johnson, S. Z., Wills, K., McKernon, W., Rose, B., Erklin, S., et al. (2002). Observed and perceived parental overprotection in relation to psychosocial adjustment in preadolescents with a physical disability: The mediational role of behavioral autonomy. *Journal of Consulting and Clinical Psychology*, *70*, 96–110.

Hupcey, J. E. (1998). Social support: Assessing conceptual coherence. *Qualitative Health Research*, *8*, 304–318.

Ingersoll, G. M., Orr, D. P., Herrold, A. J., & Golden, M. P. (1986). Cognitive maturity and self-management among adolescents with insulin-dependent diabetes mellitus. *Journal of Pediatrics*, *108*, 620–623.

Jackson, S., Bijstra, J., Oostra, L., & Bosman, H. (1998). Adolescents' perceptions of communication with parents relative to specific aspects of relationship with parents and personal development. *Journal of Adolescence*, *21*, 305–322.

Johnson, S. B. (1994). Health behavior and health status. concepts, methods and applications. *Journal of Pediatric Psychology*, *19*, 129–141.

Karvonen, M., LaPorte, R., Vilk-Kajander, M., Toumilehto, J., Moltchanova, E., & Libman, I. (2000). Incidence of childhood type 1 diabetes worldwide. *Diabetes Care*, *23*, 1516–1526.

Kerlinger, F. N. (1986). *Foundations of behavioral research*. Chicago: Holt, Rinehart and Winston, Inc.

Kovacs, M., Goldston, D., Obrosky, D. S., & Iyengar, S. (1992). Prevalence and predictors of pervasive noncompliance with medical treatment among youths with insulin-dependent diabetes mellitus. *Journal of American Academy of Child Adolescence Psychiatry*, *31*, 1112–1119.

Kronenberger, W. G., & Thompson, R. J., Jr. (1990). Dimensions of family functioning in families with chronically ill children: A higher order factor analysis of the family environment. *Journal of Clinical Child Psychology*, *19*, 380–388.

La Greca, A. M., Auslander, W. F., Greco, P., Spetter, D., Fisher, E. B., & Santiago, J. V. (1995). I get by with a little help from my family and friends: Adolescents' support for diabetes care. *Journal of Pediatric Psychology*, *20*, 449–476.

La Greca, A. M., & Bearman, K. J. (2002). The Diabetes Social Support Questionnaire—Family Version: Evaluating adolescents' diabetes-specific support from family members. *Journal of Pediatric Psychology*, *27*, 665–676.

La Greca, A. M., Follansbee, D., & Skyler, J. S. (1990). Developmental and behavioral aspects of diabetes management in youngsters. *Children's Health Care*, *19*, 132–139.

Lamborn, S. D., Mounts, N. S., Steinberg, L., & Dornbusch, S. M. (1991). Patterns of competence and adjustment among adolescents from authoritative, authoritarian, indulgent, and neglectful families. *Child Development*, *62*, 049–1065.

Lawler, M. K., Volk, R., Viviani, N., & Mengel, M. B. (1990). Individual and family factors impacting diabetic control in the adolescent: A preliminary study. *Maternal-Child Nursing Journal*, *19*, 331–345.

Libman, I. M., Dorman, J. S., LaPorte, R. E., Drash, A. L., Becker, D., & Kuller, L. (1998). Was there an epidemic of diabetes in nonwhite adolescents in Allegheny Count, Pennsylvania? *Diabetes Care*, *21*, 1278–1281.

MacCallum, R. C., Widaman, K. F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological Methods*, *4*, 84–99.

Marteau, T. M., Bloch, S., & Baum, J. D. (1987). Family life and diabetic control. *American Psychological Psychiatry*, *28*, 823–833.

McCaul, K. D., Glasgow, R. E., & Schafer, L. C. (1987). Diabetes regimen behaviors. *Medical Care*, *25*, 868–881.

McKelvey, J., Waller, D., North, A. J., Marks, J. F., Schreiner, B., Travis, L. B., et al. (1993). Reliability and validity of the diabetes family behavior scale (DFBS). *Diabetes Educator*, *19*, 125–132.

McKelvey, J., Waller, D. A., Steward, S. M., Kennard, B. D., North, A. J., & Chipman, J. J. (1989). Family support for diabetes: A pilot study for measuring disease-specific behaviors. *Children's Health Care*, *18*, 37–41.

McNabb, W. L., Quinn, M. T., Murphy, D. M., Thorp, F. K., & Cook, S. (1994). Increasing children's responsibility for diabetes self-care: The In Control study. *Diabetes Educator*, *20*, 121–124.

Miller-Johnson, S., Emery, R., Marvin, R., Clarke, W., Lovinger, R., & Martin, M. (1994). Parent–child relationships and the management of insulin-dependent diabetes mellitus. *Journal of Consulting and Clinical Psychology*, *62*, 603–610.

National Institutes of Health. *Diabetes in America, Second Edition: 1995*. NIH Publication No. 95-1468. Bethesda, MD: National Diabetes Data Group of the National Institute of Diabetes and Digestive and Kidney Diseases.

Newsom, J., & Schulz, R. (1998). Caregiving from the recipient's perspective: Negative reactions to being helped. *Health Psychology*, *17*, 172–181.

Oeltman, J. E., Addy, C., Liese, A. D., Mayer-Davis, E. J., & Heinze, H. J. (2003). Prevalence of diagnosed diabetes among African-American and non-Hispanic White youth, 1999. *Diabetes Care*, *26*, 2531–2535.

Palmer, D. L., Berg, C. A., Wiebe, D. J., Beveridge, R. M., Korbel, C. D., Upchurch, R., et al. (2004). The role of autonomy and pubertal status in understanding age differences in maternal involvement in diabetes responsibility across adolescence. *Journal of Pediatric Psychology*, *29*, 35–46.

Pendley, J. S., Kasmen, L., Miller, D., Donze, J., Swenson, C., & Reeves, G. (2002). Peer and family support in children and adolescents with type 1 diabetes. *Journal of Pediatric Psychology, 27*, 429–438.

Peyrot, M., Steinberg, E., Rubin, R., & Young-Hyman, D. *Diabetes-specific conflict in families of children and adolescents with diabetes*. Unpublished manuscript. In press.

Rubin, R. R., Young-Hyman, D., & Peyrot, M. (1989). Parent–child responsibility and conflict in diabetes Care. *Diabetes, 38*(Suppl. 2), 28.

Schafer, L. C., Glasgow, R. E., McCaul, K. D., & Dreher, M. (1983). Adherence to IDDM regimens: Relationship to psychosocial variables and metabolic control. *Diabetes Care*, *6*, 493–498.

Schafer, L. C., McCaul, K. D., & Glasgow, R. E. (1986). Supportive and nonsupportive family behaviors. *Diabetes Care*, *9*, 179–185.

Seiffge-Krenke, I. (1998). The highly structured climate in families of adolescents with diabetes: Functional or dysfunctional for metabolic control? *Journal of Pediatric Psychology*, *23*, 313–322.

Sessa, F. M., & Steinberg, L. (1991). Family structure and the development of autonomy during adolescence. *Journal of Early Adolescence*, *11*, 38–55.

Skinner, T. C., & Hampson, S. E. (1998). Social support and personal models of diabetes in relation to self-care and well-being in adolescents with type 1 diabetes mellitus. *Journal of Adolescence*, *21*, 703–715.

Smetana, J. G. (1989). Adolescents' and parents' reasoning about actual family conflict. *Child Development*, *60*, 1052–1067.

Steinberg, L. (1990). Autonomy, conflict, and harmony in the family relationship. In N. S. Feldman & G. Elliot (Ed.), *At the threshold: The developing adolescent* (pp. 255–276). Cambridge, MA: Harvard University Press.

Steinberg, L. & Morris, A. S. (2001). Adolescent development. *Annual Review of Psychology*, *52*, 83–110.

Stewart, S. M., Lee, P. W., Low, L. C., Cheng, A., Yeung, W., Huen, K., et al. (2000). Pathways from emotional adjustment to glycemic control in youths with diabetes in Hong Kong. *Journal of Pediatric Psychology*, *25*, 393–402.

Tabachnick, B., & Fidell, L. (1989). Principal components and factor analysis. In B. Tabachnick & L. Fidell (Eds.), *Using multivariate statistics* (pp. 597–677). New York: Harper & Row.

Thoits, P. (1985). Social support and psychological well-being: Theoretical possibilities. In I. Sarason & B. Sarason (Eds.), *Social support, theory, research and applications* (pp. 51–72). Boston, MA: Matinus Nijhoff Publishers.

Weist, M. D., Finney, J. W., Barnard, M. U., Davis, C. D., & Ollendick, T. H. (1993). Empirical selection of psychosocial treatment targets for children and adolescents with diabetes. *Journal of Pediatric Psychology*, *18*, 11–28.

Wierson, M., Nousiainen, S. D., Forehand, R., & Thomas, A. M. (1992). Parent–adolescent congruence on decision-making and its relation to adolescent adjustment. *Journal of Family Violence*, *7*, 9–19.

Wysocki, T., Hough, B. S., Ward, K. M., Allen, A. A., & Murgai, N. (1992). Use of blood glucose data by families of children and adolescents with IDDM. *Diabetes Care*, *15*, 1041–1044.

Wysocki, T., Hough, B., Ward, K., & Green, L. (1992). Diabetes mellitus in the transition to adulthood: Adjustment, self-care, and health status. *Journal of Developmental and Behavioral Pediatrics*, *13*, 194–201.

Wysocki, T., Taylor, A., Hough, B. S., Linscheid, T. R., Yeates, K. O., & Naglieri, J. A. (1996). Deviation from developmentally appropriate self-care autonomy. *Diabetes Care*, *19*, 119–125.

Youniss, J., & Smollar, J. (1985). *Adolescent relations with mothers, fathers, and friends.* Chicago: University of Chicago Press.