

Assessing Friend Support of Adolescents' Diabetes Care: The Diabetes Social Support Questionnaire-Friends Version

Karen J. Bearman, MS, and *Annette M. La Greca*, PhD
University of Miami

Objective: To develop and evaluate the Diabetes Social Support Questionnaire for Friends (DSSQ-Friends), a measure of friends' supportive behaviors for adolescents with diabetes. Gender and age differences in friends' support for diabetes were examined, as well as the relationship between friend support and adolescents' treatment adherence.

Methods: Seventy-four adolescents (11–18 years) completed the DSSQ-Friends in addition to other measures of social support and a measure of treatment adherence. The behaviors on the DSSQ-Friends were scored for supportiveness and frequency. A combined rating (frequency \times support) was also calculated to adjust the frequency of friends' support for adolescents' perceptions of supportiveness.

Results: The DSSQ-Friends had acceptable internal consistency and good test-retest reliability; it correlated well with other measures of friend support. Age-related differences were minimal; however, compared to boys, girls reported more friend support for blood glucose testing and emotions. Friend support was not related to overall treatment adherence but was related to adherence for blood glucose testing.

Conclusions: We discuss the utility of the DSSQ-Friends as a clinical and research tool for measuring diabetes-specific friend support and offer suggestions for future research on friends' support for adolescents' diabetes care.

Key words: *type 1 diabetes; adolescents; friends; social support; adherence.*

Type 1 diabetes is a challenging disease, with a daily regimen that includes multiple insulin injections, monitoring of blood glucose levels, and a special diet and exercise regimen. Treatment management is very difficult, especially for adolescents who are experiencing a series of social, psychological, emotional, and physiological changes (Burroughs, Har-

ris, Pontious, & Santiago, 1997; Kyngas, 2000). Thus, efforts to identify factors that might promote good diabetes management and disease adaptation among adolescents are needed.

Social support from close friends may be an important factor to examine. Adolescents spend most of their daytime hours in school or leisure settings with friends (La Greca & Prinstein, 1999). Moreover, close friends represent a significant source of emotional support (Hartup, 1996) and may facilitate ad-

All correspondence should be sent to Karen Bearman, Department of Psychology, P.O. Box 249229, University of Miami, Coral Gables, Florida 33124. E-mail: kbearman@umiami.ir.miami.edu.

olescents' adjustment to a chronic disease or their ability to cope with a difficult medical treatment (Burroughs et al., 1997; La Greca, 1990). However, at the present time, most of the research examining the linkages between adolescents' friendships and their health have focused exclusively on health-risk behaviors, such as smoking, drinking, or substance use (e.g., La Greca, Prinstein, & Fetter, 2001; Prinstein, Boegers, & Spirito, 2001; Urberg, 1992). Additional efforts are needed to examine the potentially positive influences that friends may have on adolescents' disease management and adaptive health behaviors (Burroughs et al., 1997).

A limited body of literature has begun to address the role of adolescents' friends in diabetes management. Specifically, La Greca and colleagues (1995) used a structured interview to examine friend and family support for diabetes care, finding that friends and family members provided distinct and complementary types of support. Family members provided more support than friends for daily management tasks, such as insulin administration and meals, but friends provided more support for exercise and for "feeling good" about diabetes (i.e., emotional support). Following from this research, Greco, Shroff-Pendley, McDonnell, and Reeves (2001) have begun to develop a diabetes intervention that includes adolescents' best friends and encourages friends to assist with diabetes regimen demands.

Despite these promising trends, further research is needed. To encourage further study of the specific ways that adolescents' friends provide support for their diabetes care, this study developed and tested a new questionnaire measure of friend support: the Diabetes Social Support Questionnaire-Friends Version (DSSQ-Friends). Prior work has used a structured interview to assess friends' support for diabetes (La Greca et al., 1995). Although this yielded important information, there are several advantages to using a questionnaire format for assessing friend support. First, a questionnaire may be easier to administer and score than a structured interview. As a result, trained interviewers and a complex coding system are not needed. Second, a questionnaire does not rely as heavily on adolescents' ability to recall specific support behaviors as does a structured interview, which may miss important support behaviors if adolescents are unable to recall relevant information. Finally, because adolescents rate the same set of behaviors on a questionnaire, it is easier to compare the results across studies and across pe-

diatric samples than is the case for a structured interview. Thus, given the potential advantages of using a questionnaire to assess adolescents' diabetes-specific support from friends, the primary goal of this study was to develop and evaluate such a questionnaire, the DSSQ-Friends.

Using an experimental pool of items developed to assess diabetes-specific support across several key aspects of diabetes care (e.g., insulin administration, blood glucose testing, meals, exercise, and emotional support), adolescents rated how supportive they perceived the behaviors to be and how often they received such support from friends. Items perceived as low in supportiveness and that occurred infrequently were eliminated, and the remaining items were examined. The ratings of supportiveness were used for descriptive purposes to identify the areas of friends' support for diabetes that adolescents perceived to be most supportive. The ratings of frequency were used to identify the areas in which adolescents received the most friend support. In addition, a combined score was calculated (support \times frequency) to examine the frequency of friends' support adjusted for adolescents' own perceptions of the supportiveness of the behavior (i.e., not all the behaviors on a support questionnaire may be perceived as supportive by individual adolescents). Consistent with prior work on social support from family members (e.g., La Greca et al., 1995; Schafer, McCaul, & Glasgow, 1986) the frequency of the support behaviors and the combined ratings were subsequently used in analyses that examined the linkages between the DSSQ-Friends and other key variables of interest.

To evaluate the psychometric properties of the DSSQ-Friends, we examined the internal consistencies and test-retest reliabilities of the scores derived from the measure. In addition, validity was evaluated by examining correlations between the DSSQ-Friends (using the frequency and combined ratings) and other measures of family and friend support. We expected that the DSSQ-Friends would correlate most strongly with another measure of diabetes-specific support from friends (the DSSI-Friends) and would also correlate with a general measure of emotional support from friends. We expected the DSSQ-Friends to be less related to measures of family support.

The next study goal was to evaluate gender- and age-related differences in adolescents' perceptions of supportive friend behaviors and their frequency. Because the transition into adolescence is a difficult

one for youths with diabetes (Follansbee, 1989), we included youths as young as 11 and as old as 18, to capture the “budding” adolescent as well as those who are more mature. Based on prior findings (La Greca et al., 1995), age-related differences in friend support were not expected. However, girls were expected to report more friend support for diabetes than boys. The developmental literature has consistently found that adolescent girls report having more friends than boys (e.g., Urberg, Degirmencioglu, Tolson, & Halliday-Scher, 1995) and report more intimacy in their friendships (Berndt, 1982). Also, prior work with a structured interview found girls to report more disease-specific social support than boys (La Greca et al., 1995).

The final goal of the study was to examine the linkages between friend support on the DSSQ-Friends and adolescents’ treatment adherence. The only study to date that has examined this issue (La Greca et al., 1995) did not find a relationship between friend support and adherence. Since this was the only study examining the role of friend support in adherence, those authors cautioned that it might be premature to conclude that the two constructs were unrelated. Thus, this study will contribute to a growing understanding of whether friends’ support for diabetes care is linked with better treatment adherence for adolescents with diabetes.

Method

Participants

Participants were 74 adolescents (60% boys) with type 1 diabetes who were recruited from a pediatric endocrinology clinic in the Midwest. The sample’s mean age was 14.2 years ($SD = 2.3$; range = 11–18 years) and the average disease duration was 5.2 years ($SD = 3.5$). (Fourteen participants were 11 years old, 12 were 12, 10 were 13, 10 were 14, 10 were 15, 6 were 16, 6 were 17, and 6 were 18.) The ethnic composition of the sample was 83.3% Caucasian ($n = 62$), 10.8% African American ($n = 8$), 4.0% Asian American ($n = 3$), and 1.4% Hispanic American ($n = 1$). The adolescents predominantly came from two-parent families (78.4%), with smaller percentages of adolescents from single-parent homes (12.2%) or other living arrangements (9.3%). The sample was primarily lower to upper middle class, reflecting the population served by the clinic (i.e., fee for service, insured).

Procedure

Adolescents were recruited during their regularly scheduled appointments for diabetes care. Youths between the ages of 11 and 18 years, who had diabetes for at least 6 months, and who were accompanied by a parent or legal guardian were eligible for participation. The participation rate was 90%, and the primary reason for refusal to participate was not having enough time to complete the forms during the scheduled visit. Prior to participation, signed consent forms were obtained from both the adolescent and the parent or guardian. A graduate student in social work was trained to administer the measures. Adolescents were compensated \$20 for participating, provided by a university-based grant to A. M. La Greca.

Measures

Diabetes Social Support Questionnaire-Friend Version (DSSQ-Friends). The DSSQ-Friends is a self-report measure of friends’ support for diabetes care (original and final versions are available from the authors). A parallel version has been developed to assess family support for diabetes (DSSQ-Family; La Greca & Bearman, 2000, 2001). Items for the DSSQ-Friends and DSSQ-Family were developed from (1) focus groups and interviews with adolescents, asking their views about supportive behaviors in various areas of diabetes care; (2) interviews with diabetes experts; and (3) supportive behaviors generated from prior research (La Greca et al., 1995). The initial pool of 58 items covered five areas of diabetes care: insulin administration (10 items), blood glucose testing (14 items), meals (20 items), exercise (9 items), and emotional support (5 items). At the time the DSSQ was developed, it appeared that many of the 58 items were likely to be more relevant for family members’ support than for friends’ support. However, rather than eliminate items on a subjective basis, we rated all 58 items for perceived supportiveness and frequency of occurrence. Items that received very low ratings for perceived support and for frequency were subsequently eliminated before further analyses.

Supportiveness for each item was assessed by the question: “How does this make you feel? or How would you feel?” Adolescents rated the degree of supportiveness (−1 = not supportive, 0 = neutral, 1 = a little supportive, 2 = supportive, 3 = very supportive). The anchors for 1 to 3 were identical to

those used for the Diabetes Social Support Interview (DSSI; La Greca et al., 1995); in addition, because items were provided on the checklist rather than generated by the adolescents, we allowed for the possibility that behaviors would be viewed as not supportive (-1) or neutral (0). Support scores for each item were averaged across the adolescents.

Frequency for each item was assessed by the question, "How often does a friend . . . ?" Ratings were: 0 = never, 1 = less than 2 × a month, 2 = twice a month, 3 = once a week, 4 = several times a week, 5 = at least once a day. The ratings for 1 to 5 were identical to those used for the DSSI (La Greca et al., 1995); in addition, the possibility that the behavior did not occur (score = 0) was added. Frequencies for each item were averaged across the adolescents.

Finally, ratings for each item were combined multiplicatively (support × frequency) to formulate a combined or individualized score. The combined score takes into account both the frequency and supportiveness of each behavior as perceived by the adolescent and can range from -5 (unsupportive behavior that occurs frequently) to 15 (very supportive and very frequent behavior). Combined scores were calculated for each item and averaged across the adolescents.

Before further analyses, items were eliminated that were not relevant for friends' support of diabetes care. Specifically, items were removed if they were generally perceived as neutral or negative in support (50% or more of the ratings were -1 or 0) and were rated as very low in frequency (75% or more of the ratings were 0 or 1). This reduced the item pool to 28 items.¹ (See Table I.) The revised DSSQ-Friends had the following distribution of support behaviors: insulin (2 items), blood testing (6 items), meals (13 items), exercise (4 items), and emotional (3 items). Using these items, we calculated average scores for supportiveness, frequency, and combined support for each of the five different areas of diabetes care. These sets of scores were also averaged to obtain an overall summary

index of support, frequency, and combined support.

Diabetes Social Support Interview (DSSI). The DSSI is a structured interview developed to assess adolescents' reports of support for diabetes care received from family members (DSSI-Family) and friends (DSSI-Friends) (La Greca et al., 1995). Adolescents responded to five open-ended questions pertaining to support from family members and five pertaining to friends for the key areas of diabetes care (i.e., insulin, blood testing, meals, exercise, emotions). Each response was rated for the degree of support (1 to 3) and how frequently it occurred (1 to 5); scores were multiplied to reflect both frequency and supportiveness and could range from 1 to 15. Total scores were calculated by separately summing the five questions' scores for family members (DSSI-Family total) and for friends (DSSI-Friend total). Using the same procedures, La Greca et al. (1995) reported good reliability and validity for the DSSI-Family and the DSSI-Friend. For example, interrater reliability for the main scores obtained from the DSSI ranged from .93 to .98 (La Greca et al., 1995). In addition, the DSSI-Friend total was significantly related to general social support from friends ($r = .32$) but not to measures of general family support.

Perceived Social Support from Friends and Family (PSS-Fr; PSS-Fa; Procidano & Heller, 1983). The PSS-Fr and the PSS-Fa assess adolescents' general emotional support from friends and family. Each scale contains 20 items answered in a "yes," "no," "don't know" format; higher scores reflect greater support (range = 0 to 20). The PSS-Fa and PSS-Fr have been used with adolescents and adults with diabetes (La Greca et al., 1995; Lyons, Perotta, Hancher-Kvam, 1988). Prior research supports the reliability and validity of the instrument. Lyons et al. reported internal consistencies ranging from .84 to .92 across various samples and reported significant correlations between perceived friend support and positive health status. For this sample, internal consistencies were .75 for the PSS-Fa and .77 for the PSS-Fr.

Adherence. Adolescents' treatment adherence was assessed using a structured questionnaire developed by Hanson, Henggeler, and Burghen (1987). The measure includes multiple aspects of diabetes management, such as insulin administration, glucose testing, meals, and treating hypoglycemia. A total score (ranging from 0 to 41) was calculated from the adolescents' responses, with higher scores reflecting better treatment adherence. Previous research (Hanson et al., 1987; Hanson, De Guire,

¹T tests were conducted to check on the supportiveness and frequency of the items that were retained versus eliminated, revealing significant differences. Specifically, retained items had higher scores for supportiveness than eliminated items in the areas of insulin ($t [74] = 3.91, p < .001$), blood testing ($t [74] = 7.80, p < .001$), meals ($t [74] = 7.71, p < .001$), exercise ($t [74] = 8.42, p < .001$), and emotional support ($t [74] = 7.72, p < .001$). Similarly, retained items had higher frequency scores than eliminated items in the areas of insulin ($t [74] = 5.44, p < .001$), blood testing ($t [74] = 10.73, p < .001$), meals ($t [74] = 11.70, p < .001$), exercise ($t [74] = 12.35, p < .001$), and emotions ($t [74] = 10.06, p < .001$).

Table 1. Means (SDs) for Peer Support Behaviors on the DSSQ-Friends ($n = 74$)

Item	Support	Frequency	Frequency × Support
Insulin injections			
Remind you to take your shots.	1.12 (1.3)	.89 (1.3)	1.77 (3.1)
Let you know how difficult it is to take insulin shots.	1.36 (1.3)	1.29 (1.5)	2.96 (4.3)
Insulin injections mean	1.24 (1.1)	1.10 (1.2)	2.41 (3.2)
Blood glucose testing			
Ask you about the results of your blood tests.	1.28 (1.3)	1.49 (1.4) ^a	2.78 (3.4)
Watch you test your blood sugar to see what the values are.	1.19 (1.3) ^b	1.34 (1.4) ^a	2.56 (3.7)
Remind you to test your blood sugar.	1.15 (1.3) ^a	.97 (1.3)	2.05 (3.2)
Let you know that they appreciate how hard it is to test blood sugar.	1.34 (1.3)	1.25 (1.4) ^a	2.92 (3.8)
Watch you for signs that your blood sugar is low.	1.76 (1.4) ^a	1.96 (1.8) ^a	5.01 (5.2)
Help out when you might be having a reaction.	1.99 (1.2) ^a	1.96 (1.8)	4.97 (5.1)
Blood glucose testing mean	1.45 (1.0)	1.50 (1.1)	3.41 (3.0)
Meals			
Encourage you to eat the right foods.	1.32 (1.2) ^a	1.73 (1.6)	3.53 (4.5)
Let you know understand how important it is for you to eat right.	1.31 (1.3)	1.61 (1.7)	3.51 (4.7)
Ask if certain foods are okay for you to eat before serving them.	1.77 (1.2)	2.42 (1.6)	5.24 (4.6)
Schedule meals at the times you need to eat.	1.08 (1.3)	1.05 (1.4)	2.16 (3.6)
Remind you about sticking to your meal plan.	1.14 (1.3)	1.31 (1.6)	2.73 (4.5)
Suggest foods you can eat on your meal plan.	1.01 (1.3)	1.06 (1.4)	2.19 (3.7)
Join you in eating the same foods as you.	1.30 (1.3) ^a	1.74 (1.5)	3.41 (4.2)
Get on your case after you ate something you shouldn't.	1.03 (1.4)	1.21 (1.6)	1.94 (4.0)
Avoid tempting you with food or drinks you shouldn't have.	1.39 (1.4)	1.89 (1.8)	3.95 (5.3)
Watch what you eat to make sure that you eat the right foods.	1.03 (1.3)	1.24 (1.6)	2.54 (4.1)
Eat at the same time you do.	1.39 (1.3)	1.91 (1.7) ^a	3.97 (4.9)
Buy special foods that you can eat.	1.24 (1.3)	1.31 (1.5)	2.74 (4.2)
Tell you not to eat something you shouldn't.	1.15 (1.4)	1.42 (1.5)	2.82 (4.2)
Meals mean	1.24 (1.0)	1.53 (1.0)	3.14 (2.9)
Exercise			
Suggest ways you can get exercise.	1.20 (1.3)	1.65 (1.8)	3.51 (4.9)
Invite you to join in exercising with them.	1.89 (1.2)	2.93 (1.6)	6.49 (5.1)
Encourage you to join an organized sports activity.	1.28 (1.3)	1.82 (1.6)	3.43 (4.8)
Exercise with you.	2.05 (1.2)	3.11 (1.7)	7.39 (5.4)
Exercise mean	1.61 (1.0)	2.38 (1.3)	5.21 (4.1)
Emotional support			
Available to listen to concerns or worries about your diabetes care.	1.86 (1.2)	2.73 (1.8) ^a	6.68 (5.7)
Encourage you to do a good job of taking care of your diabetes.	1.37 (1.3) ^a	1.62 (1.6)	3.60 (4.7)
Understand when you sometimes make mistakes in taking care of your diabetes.	1.26 (1.3)	1.36 (1.5) ^b	2.99 (4.2)
Emotional support mean	1.50 (1.1)	1.91 (1.3)	4.43 (4.1)
DSSQ-Friends overall mean	1.41 (0.9)	1.68 (0.9)	3.81 (2.9)

Possible range of scores: supportiveness = -1 to 3; frequency = 0 to 5; combined ratings = -5 to 15.

^aIndicates a significant gender difference ($p < .05$) with girls reporting higher scores than boys.

^bIndicates a significant gender difference ($p < .01$) with girls reporting higher scores than boys.

Schinkel, Henggeler, & Burghen, 1992) supports the reliability of the interview. For example, test-retest reliabilities over 3 months and 6 months have been reported to be .70 and .73, respectively. In addition, these researchers have reported interrater reliabilities ranging from .95 to .98. Higher levels of adherence, as assessed by this measure, have been related to better glycemic control in youth with diabetes (e.g., Hanson et al., 1987).

Results

Descriptive Data for the DSSQ-Friends

For descriptive purposes, Table I contains the means and standard deviations for the support, frequency, and combined scores for each of the 28 items on the DSSQ-Friends. In general, items that adolescents' gave the highest support ratings to were in

Table II. DSSQ-Friends: Scores for Frequency, Supportiveness, and Combined Ratings and Results of Paired *t* Test and Internal Consistency (*n* = 74)

Subscale	<i>M</i> (<i>SD</i>)	Blood glucose	Meals	Exercise	Emotional	Internal consistency
Supportiveness						
Insulin injections	1.24 (1.13)	-2.47*	-.06	-3.15**	-2.77**	.67
Blood glucose	1.45 (1.01)	—	2.72**	-1.73	-.53	.87
Meals	1.24 (.96)		—	-4.03***	-2.82**	.94
Exercise	1.61 (.99)			—	1.08	.81
Emotional	1.50 (1.07)				—	.80
Total	1.41 (.90)					.93
Frequency						
Insulin injections	1.10 (1.18)	-4.39***	-3.99***	-7.59***	-2.86**	.58
Blood glucose	1.50 (1.12)	—	-.33	-4.96***	-2.84**	.83
Meals	1.53 (1.03)		—	-5.64***	-2.91**	.89
Exercise	2.38 (1.29)			—	2.62*	.76
Emotional	1.91 (1.33)				—	.74
Total						.96
Combined ratings						
Insulin injections	2.41 (3.19)	-4.14***	-2.37*	-6.32***	-4.94***	.57
Blood glucose	3.41 (3.04)	—	1.06	-3.96***	-2.52*	.81
Meals	3.14 (2.92)		—	-5.01***	-3.36*	.90
Exercise	5.21 (4.08)			—	1.75	.82
Emotional	4.43 (4.10)				—	.79
Total						.94

p* < .05.*p* < .01.****p* < .001.

the areas of exercise (e.g., “exercise with you”), emotional support (e.g., “available to listen to concerns or worries about your diabetes care”), and blood glucose testing (e.g., “help out when you might be having a reaction”). Adolescents tended to view friend support for insulin injections (e.g., “remind you to take your shots”), and meals (e.g., “tell you not to eat something you shouldn’t”) less favorably.

Of particular interest were adolescents’ ratings of how often the friends’ behaviors occurred and the ratings of combined support (support × frequency) that were used in subsequent analyses to evaluate the utility of the DSSQ-Friends. Friend support was frequently reported for exercise behaviors (e.g., “invite you to join in exercising with them,” “exercise with you”), emotional support (e.g., “listening to concerns . . . about diabetes”), and for helping with reactions (e.g., “watch for signs that your blood sugar is low,” “help out when you might be having a reaction”).

To systematically examine the differences among the various areas of diabetes care for the ratings of supportiveness, frequency, combined sup-

port, we conducted paired *t* tests (see Table II). These analyses confirmed the informal observations offered above. Specifically, for perceived *supportiveness*, friends’ support for exercise, emotions, and blood glucose testing was viewed as most supportive (and not significantly different from each other), and was significantly more supportive than friend support for insulin injections and meals. For the *frequency* ratings, friends were reported to provide the most frequent support for exercise (more than all other areas), followed by emotions (higher than the remaining areas), and then by support for meals and blood glucose testing (which did not differ). Friends provided the least frequent support for insulin injections. For the *combined scores* (support × frequency), which adjust the frequency scores for the individual adolescent’s perceived supportiveness of the behaviors, a similar pattern was obtained. Specifically, friends’ support for exercise and emotions was the highest and did not differ from each other; friends’ support for blood glucose testing and meals came next (not different), followed by insulin injections, significantly lower than all other areas.

Table III. Pearson Correlations Between the DSSQ-Friends and Measures of Social Support ($n = 74$)

Social support measures	Frequency		Combined ratings	
	Total	Emotional	Total	Emotional
Friend measures				
Diabetes Social Support Interview (DSSI-Friend)	.48***	.43***	.49***	.44***
Perceived Social Support (PSS-Fr)	.23*	.42***	.22*	.38***
Family measures				
Diabetes Social Support Interview (DSSI-Family)	.22*	.25*	.35**	.29**
Perceived Social Support (PSS-Fa)	.18	.13	.22*	.14

* $p < .05$.** $p < .01$.*** $p < .001$.

Psychometric Support

Reliability. The internal consistencies of the scores obtained from the DSSQ-Friends were calculated using Cronbach's alpha (see Table II). The total scores as well as scores within each area of diabetes care had acceptable levels of internal consistency ($r_s > .70$), with the exception of insulin administration. However, this area of diabetes care was represented by only two items.

The test-retest reliability of the DSSQ-Friends was assessed on an independent sample of adolescents with diabetes² ($n = 25$) over a 2-week period. The retest correlations were high (range = .78–.94, all $p_s < .001$) for the support, frequency, and combined ratings for each area of diabetes care, indicating that there is good stability in adolescents' responses to the DSSQ-Friends.

Intercorrelations. Correlations among the scores obtained from the DSSQ-Friends were examined. For ratings of supportiveness, correlations among the five areas of diabetes care were moderate to high (range = .55–.78; median = .71; all $p_s < .001$). For ratings of frequency, the correlations among the five areas were moderate (range = .20–.76; median = .49; $p_s < .01$), as were those for the combined ratings (range = .43–.78; median = .56; $p_s < .001$).

Correlations between the supportiveness ratings and the corresponding frequency ratings for the five areas of diabetes care were moderate (range = .35–.65; median = .56; $p_s < .01$), suggesting that the two types of ratings were reasonably distinct. Both the supportiveness and the frequency ratings were highly correlated with the corresponding combined

rating (which was a product of the two); correlations ranges from .67 to .92 (median = .82).

Correspondence With Other Support Measures. The validity of the DSSQ-Friends was examined by computing correlations between this measure and the other measures of general emotional support (PSS-Fr and PSS-Fa) and diabetes-specific support (DSSI-Friends and DSSI-Family).³ (See Table III.) Correlations were conducted using both the DSSQ-Friends total score (for the frequency and the combined ratings) as well as the DSSQ-Friends scores for emotional support. The emotional support scores were included because the general measures of friend and family support (PSS-Fr and PSS-Fa) are primarily measures of emotional support.

As expected, the DSSQ-Friends total scores—both for frequency and the combined ratings—were most highly correlated with diabetes-related support from friends (DSSI-Friend).⁴ Similarly, the DSSQ-Friends scores for emotional support were most highly correlated with the interview measure of friends' support for diabetes care. Also, as expected, the various scores from the DSSQ-Friends were significantly related to a general measure of support from friends (PSS-Fr).

Further, the scores of the DSSQ-Friends were correlated at a low to moderate level with diabetes-specific support from family members (DSSI-Family). For the frequency ratings, the magnitude

³The means for the other support measures were PSS-Fr ($M = 10.42$, $SD = 6.2$); PSS-Fa ($M = 8.08$, $SD = 8.1$); DSSI-Friend total ($M = 34.14$, $SD = 23.6$); and DSSI-Family total ($M = 61.18$, $SD = 31.2$).

⁴Because the DSSI-Friends is an open-ended interview, adolescents rate only the behaviors they describe. Typically, adolescents gave two or three responses to each of the five interview questions and thus rated about 10–15 behaviors. This differed from the DSSQ-Friends, where 28 behaviors were scored and analyzed. The differences in the two instruments and the number of items rated lead us to expect that the measures would not be highly correlated but would be at least moderately correlated, since they were both measuring aspects of friend support for diabetes care.

²These adolescents were also recruited from a pediatric endocrinology clinic at a major medical center. Their mean age was 13.8 years ($SD = 1.7$ years; range 11–17 years), and the adolescents' duration of diabetes was 4.6 years ($SD = 3.3$ years; range = 1.0–14.3 years).

of the correlations between the DSSQ-Friends and the other measures of friend support was higher than corresponding correlations with measures of family support, although the differences between the sets of correlations were not significant (using Fisher's z test). For the combined ratings, the magnitude of the correlations between the DSSQ-Friends and the disease-specific measures of friend support were also higher than corresponding correlations with measures of diseases-specific family support, although the differences were not significant.

Relationship Between the DSSQ-Friends and Adolescent Age and Gender

Another goal of this study was to examine the relationship between friend support for diabetes and adolescent age and gender. Across all five areas of diabetes care, adolescent age was unrelated to the frequency, supportiveness, or the combined ratings of friends' diabetes-specific behaviors, with one exception. Older adolescents reported less combined support (support \times frequency) for exercise than younger adolescents ($r = -.20$, $p < .05$). None of the frequency or support ratings for the 28 individual items was correlated with age. Thus, adolescent age appeared to be generally unrelated to the frequency and supportiveness of friends' diabetes-specific support.

Girls were expected to report more support from friends than boys. As seen in Table IV, the mean scores for support and frequency were consistently higher for girls than for boys, with the exception of the frequency of exercise support. Using multivariate analysis of variance for the sets of support and frequency variables, significant gender differences were apparent (Wilks' lambda: $F(5, 68) = 2.87$, $p < .05$ for support; $F(5, 68) = 3.82$, $p < .005$ for frequency; $F(5, 68) = 3.11$, $p < .05$, for combined ratings). Specifically, girls perceived friends' blood glucose testing behaviors to be more supportive than boys did, $F(1, 72) = 8.18$, $p = .006$, and reported more frequent friend support for blood glucose testing, $F(1, 72) = 7.70$, $p = .007$, and emotions, $F(1, 72) = 8.66$, $p = .004$. Similarly, for the combined ratings, girls gave higher ratings than boys for friends' support of blood glucose testing, $F(1, 72) = 8.11$, $p = .006$, and emotions, $F(1, 72) = 7.05$, $p = .01$. Within the areas of blood glucose testing, emotions, and meals, gender differences were apparent for several individual items on the DSSQ-Friends ($ps < .05$), with girls reporting higher perceived supportiveness or greater frequency of the

Table IV. DSSQ-Friends: Comparison of Boys and Girls ($n = 74$)

Variable	Boys ($n = 45$)	Girls ($n = 29$)
	M (SD)	M (SD)
Mean supportiveness		
(total)	1.25 (0.85)	1.65 (0.93)
Insulin injections	1.04 (1.13)	1.53 (1.08)
Blood glucose testing	1.19 (0.98)	1.85 (0.95)*
Meals	1.11 (0.83)	1.44 (1.12)
Exercise	1.58 (0.95)	1.66 (1.07)
Emotional support	1.30 (1.04)	1.79 (1.07)
Mean frequency (total)	1.52 (0.84)	1.94 (0.96)
Insulin injections	.94 (1.13)	1.34 (1.22)
Blood glucose testing	1.22 (1.05)	1.93 (1.11)*
Meals	1.46 (0.93)	1.63 (1.19)
Exercise	2.40 (1.36)	2.34 (1.19)
Emotional support	1.56 (1.23)	2.45 (1.31)*
Mean combined		
(support \times frequency)	3.29 (2.58)	4.63 (3.25)
Insulin injections	1.84 (2.69)	3.28 (3.74)
Blood glucose testing	2.64 (2.66)	4.61 (3.23)*
Meals	2.81 (2.45)	3.63 (3.51)
Exercise	5.11 (4.17)	5.36 (4.00)
Emotional support	3.45 (3.58)	5.94 (4.45)*

*Denotes a significant gender difference, $p < .01$.

behaviors than boys. (These items are marked with superscripts in Table I.)

Friend Support as a Predictor of Adherence

The final study goal was to evaluate whether friend support predicted treatment adherence. Using hierarchical multiple regression, we entered age first as a predictor of adherence, as prior research has found age-related differences in adherence (e.g., Anderson et al., 1990). On the second step, either the set of frequency ratings (insulin, blood glucose, meals, exercise, emotions) or the parallel set of combined ratings was entered.

For the frequency ratings, age predicted adherence, with younger teens having better adherence than older teens ($\beta = -.24$, $F = 4.45$, $p < .05$). However, the frequency ratings of friend support did not add further to the prediction of overall adherence, $F(\text{step}) = 2.28$, $p = ns$. Similar results were obtained for the combined ratings (support \times frequency); once age was entered, friend support did not add further to the prediction of adherence, $F(\text{step}) = 2.23$, $p = ns$.

Additional regression analyses were conducted to further explore the linkage between friend support and adherence. Rather than predicting overall adherence, friend support for a specific area of dia-

betes (i.e., insulin, blood glucose testing, and meals) was examined as a predictor of adherence to the same area of diabetes care. (Insulin, blood glucose testing, and meals were selected, as both the DSSQ-Friends and the measure of adherence provided separate scores for these areas of diabetes care). Again, age was entered first into the regression analyses. The results revealed that, even when controlling for age, the frequency and the combined ratings for friend support of blood glucose testing were significant predictors of adolescents' adherence to blood glucose testing, $F(\text{step}) = 12.96, p < .001$; $F(\text{step}) = 12.23, p < .001$, respectively. Specifically, adolescents with higher levels of friend support for their blood glucose testing had higher levels adherence to blood glucose testing. In addition, younger adolescents were more adherent with this aspect of diabetes ($\beta = -.44, F = 17.73, p < .001$). Neither friend support of insulin nor of meals predicted adherence in those corresponding areas of diabetes care.

Discussion

Social support is believed to be important for adjustment to and management of a chronic disease (e.g., Burroughs et al., 1997; Varni, Babani, Wallander, Roc, & Frasier, 1989), although little is known about the ways adolescents' close friends provide support for their diabetes. This is a critical oversight, given that adolescents have considerable difficulty managing their diabetes (Anderson et al., 1990; Kyngas, 2000). Yet, at the same time, close friends represent a significant source of support for adolescents (Berndt & Perry, 1986) and are their most frequent companions (Berndt, 1982). Thus, understanding how close friends provide support for diabetes may suggest ways to improve diabetes care for adolescents challenged by this disease (e.g., Greco et al., 2001). The results of this study contribute to this relatively young, but growing literature.

This is the first study to develop and evaluate a checklist measure of friend support for adolescents' diabetes care: the DSSQ-Friends. The findings provided initial support for the reliability and validity of this measure. The internal consistencies of the DSSQ-Friends scores were generally high, as were the initial test-retest reliabilities. Other findings suggested good concurrent validity for the DSSQ-Friends, as the various scores for this measure were significantly related to other measures of support from friends, especially to an interview measure of

diabetes-specific support from friends. The DSSQ-Friend scores were also more related to measures of friend support than family support, although the magnitudes of these differences did not reach statistical significance. Although these results were promising, further efforts to examine the reliability and validity of the DSSQ-Friends would be important and desirable.

In this study, we examined two key sets of scores from the DSSQ-Friends: the frequency of friends' diabetes support and the combined ratings of frequency and supportiveness (i.e., the frequency ratings adjusted for the behaviors' perceived supportiveness). Both sets of ratings yielded similar results; these scores were also highly correlated. Thus, in future studies, either set of scores may be appropriate to use. One advantage of using only the frequency scores is that it would shorten the administration time, as adolescents would not need to rate the items for supportiveness. On the other hand, the supportiveness ratings were distinct from the frequency ratings and might be useful in clinical settings for identifying the specific behaviors a particular adolescent finds to be supportive. These could then be used to enhance the adolescent's peer support for diabetes care. For example, Greco et al. (2001) involved adolescents' best friends in a four-session intervention that identified how friends could help the adolescents comply with their diabetes regimen.

One of the important features of the DSSQ-Friends is that all adolescents rate the same set of supportive behaviors. Thus, the DSSQ-Friends may be useful in studies that compare friends' diabetes-specific support across different groups of adolescents with diabetes (e.g., evaluating ethnic differences in friend support). The DSSQ-Friends may also be useful for evaluating the effects of peer interventions for adolescents with diabetes (e.g., Greco et al., 2001).

A second and related contribution of this study is that it provides an important glimpse into the kinds of friends' behaviors that adolescents perceive as supportive and how often the behaviors occur. Friends provided the most frequent support for exercise, emotions, and blood glucose testing (especially helping out with reactions), and friends' behaviors in these areas also were perceived as the most supportive. These results are consistent with findings that friends' support for diabetes is oriented toward companionship (e.g., exercising with the teen) and emotional support (La Greca et al., 1995). In contrast, it was not surprising that adoles-

cents reported less frequent friend support for insulin injections, as adolescents typically manage this aspect of diabetes on their own. Also interesting was the fact that even the most frequent friend behaviors occurred weekly or less often, suggesting that regular but occasional support from friends may be more typical than daily support.

Third, the results suggested that friends' support for diabetes, as measured by the DSSQ-Friends, is not related to age. One possible exception is support for exercise, where younger adolescents reported more frequent support than older teens. However, this was the only significant finding (among multiple correlations) and should be viewed with caution. In this special issue, Pendley and colleagues found significant relations between age and friend support using a broader age range (8–18 years). However, among only adolescents, prior research has not found age differences in diabetes-specific support from friends (La Greca et al., 1995).

In contrast, the findings did reveal gender differences in friend support, mainly for blood glucose testing and emotional support, with girls perceiving these behaviors to be more supportive and to occur more frequently than did boys. These results fit with prior research on diabetes (La Greca et al., 1995) and with developmental findings indicating that intimacy and emotional support are more salient aspects of adolescent girls' friendships than boys' (e.g., Berndt, 1982). The higher levels of friend support for girls' glucose testing may also be a function of the more intimate nature of girls' friendships, as suggested by some of the individual items (e.g., "let you know they appreciate how hard it is to test," "watch you test your blood sugar," "watch for signs your blood sugar is low"). Blood glucose testing is a somewhat invasive and intimate procedure; girls' friends may be more likely to provide support in this area than boys' friends.

Finally, this study examined the relationship between friend support for diabetes and adolescents' adherence. In general, friends' support for diabetes was not related to treatment adherence. This is consistent with prior research, in that La Greca et al. (1995) did not find friend support for diabetes care to be related to adolescents' adherence, although family support was. Nevertheless, there was some indication that friend support for blood glucose testing was predictive of adolescents' adherence to that aspect of diabetes care. This may be an important finding, as it is often difficult for adolescents to test their blood glucose on a regular basis (Kygnas,

2000; Wysocki, Green, & Huxtable, 1989). Parents and health professionals may find it useful to recruit friends to support adolescents' blood-glucose monitoring compliance. In addition, it is worth considering that friends' support for diabetes may be more strongly related to adolescents' disease adaptation and quality of life than to daily treatment adherence. This idea awaits confirmation in future research. Further examination of the ways in which friends contribute to the adjustment of adolescents with diabetes would be of interest, as would be the investigation of potential mediators or mechanisms that link friend support with positive outcomes.

Several limitations of this study may be noted for future research. First, the study relied on adolescents' reports of support and adherence. Adolescents are generally viewed as the "best" informants for adherence and social support (La Greca & Lemanek, 1996). Thus, as a starting point for developing a measure of friend support, it was necessary to obtain adolescents' input. However, an important next step would be to ask *friends* about the ways they provide support for adolescents' diabetes care. A second study limitation was that it focused on a middle-class sample. As such, the findings can best be generalized to similar adolescent populations. Additional work that examines the role of friend support in diverse cultural or ethnic groups would contribute to a better understanding of factors that facilitate diabetes management among minority youths. Research has indicated that certain minority groups, such as African Americans, have greater difficulty controlling their diabetes than other ethnic groups (e.g., Delamater et al., 1999). Finally, this study focused on friend support for diabetes, as it is an understudied area. However, it would also be of interest to examine other sources of support, such as siblings and health professionals (Burroughs et al., 1997; Ellerton, Stewart, Ritchie, & Hirth, 1996). Also, given adolescents' complex social networks, it might be informative to examine multiple sources of support simultaneously (e.g., parents, siblings, friends) rather than singling out any one source.

In conclusion, this study offers a new instrument for evaluating adolescents' friends' diabetes-specific support. This instrument may be useful in future efforts to develop and evaluate supportive peer interventions for adolescents with diabetes. Given the challenges of diabetes management, and the influence of friends in many other aspects of adolescents' lives, including risky health behaviors (e.g., Prinstein et al., 2001), it may be critical to re-

cruit adolescents' friends as sources of support for positive health care behaviors.

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