Brief Report: Initial Testing of Scales Measuring Parent and Adolescent Perceptions of Adolescents' Assumption of Diabetes Management

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Objective This study tested parallel adolescent and parent versions of the Perceptions of Adolescents' Assumption of Diabetes Management scales. **Methods** First, 78 items developed from interview data were reviewed by a panel of adolescent and diabetes experts. Next, the scales were piloted with 43 adolescents with type 1 diabetes and their parents and, finally, tested with 100 dyads. Item and principal component analyses were performed. **Results** Following content validity and item analyses, five and four items remained in the advantages and disadvantages scales, respectively. One factor accounted for between 54 and 63% of variance, and internal consistency reliability ranged between .78 and .84 for the various versions of the scales. **Conclusions** The Perceptions of Adolescents' Assumption of Diabetes Management scales show promise as parsimonious and reliable tools for use in research and practice related to parent–adolescent relationships in regard to adolescents' assumption of diabetes management.

Key words adolescents; diabetes; diabetes management responsibility; perceptions.

Adolescents are expected to assume responsibility for their diabetes management, but it is well known that many adolescents and parents struggle with this transfer of responsibility (Anderson, 2001). During this challenging time, experts recommend minimal parent–adolescent conflict to maintain metabolic control (Anderson), which is essential for reducing serious health consequences (Diabetes Control and Complications Research Group [DCCTRG], 1994). Indeed, a seminal study demonstrated that interventions targeting parent–adolescent conflict for high-risk dyads did improve interactions as well as diabetes adherence (Wysocki, Greco, Harris, Bubb, & White, 2001). More stable dyads are also susceptible to conflict (Viikinsalo, Crawford, Kimbrel, Long, & Dashiff, 2005), and discrepancies in their perceptions about decision making result in conflict (Miller & Drotar, 2003). Insight into parent–adolescent relationships provides the opportunity to refine interventions to improve interactions and the transfer of diabetes management.

Knowledge of discrepancies in perceptions specific to the assumption of diabetes management between parents and adolescents may provide direction for interventions. Only two published studies (Hanna & Guthrie, 2000a, 2000b) have reported on these specific perceptions. Both parents and adolescents' perceived advantages to adolescents' self-management reflect increased confidence in abilities, especially in preparation for the future, and greater independence for adolescents with less parental care burden. They perceived disadvantages as greater care burden for adolescents and parental loss of control, stress, and worry about

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the consequences of suboptimal management, such as hypoglycemia and long-term complications. These findings are consistent with adolescents' reported sources of parent–adolescent conflict such as parental worry (about short- and long-term complications), controlling behavior, and focus on the future in contrast to adolescents' focus on the present (Weinger, O'Donnell, & Ritholz, 2001). To assess perceptual discrepancies, parallel versions of scales to measure parents' and adolescents' perspectives are needed; however, such scales have not been available. This study's purpose was to develop and initially test parallel parental and adolescent scales to measure perceived advantages and disadvantages to adolescents assuming diabetes management.

Methods

This methodological study, part of a larger study (Hanna, DiMeglio, & Fortenberry, 2005), involved (a) item development, (b) a pilot, and (c) an initial testing. The university's Institutional Review Board approval and clinic permission were obtained. For both pilot and testing, the same sample inclusion criteria were used (see Table I), and each dyad received a $10 telephone card. For the testing sample, dyad participation in the pilot was an exclusion criterion.

Development of Items

Seventy-eight items related to the previously described perceptions of the pros and cons of adolescents assuming diabetes management (blood glucose monitoring, insulin administration, diet, and exercise) were developed. As suggested by Grant and Davis (1997), a content validity index was calculated after a review by a panel of experts in adolescent health, diabetes, and chronic illnesses for item relevance; 46 items with a content validity index of ≥.80 were retained.

Pilot

A 46-item scale was administered to 43 parent–adolescent dyads (see Table I) to assess their understanding and reduce the number of items. Devising two free-standing scales for advantages and disadvantages was the main revision based on participants' feedback that it was confusing having both in the same scale. Item analysis was conducted separately for parent and adolescent responses according to deletion criteria suggested by Ferketich (1991): low or high interitem correlations <.30 or >.70, item-to-total correlations <.30, increased

Table I. Characteristics of Samples

	Sample 1 ($N = 43$ dyads)	Sample 2 ($N = 100$ dyads)
Inclusion criteria	Teens 12–18 years old and had been diagnosed with type 1 diabetes (<10 years old) and parents living with teens and involved in diabetes care	Teens 12–18 years old and had been diagnosed with type 1 diabetes (<10 years old) and parents living with teens and involved in diabetes care
Teens—age	M = 14.6 years, SD = 1.9	M = 14.8, SD = 1.6
Teens—gender	58% female	60% male
Teens—race/ethnic status	83% Caucasian	91% Caucasian
Teens living situation	Not available	81% with two parents
Teens—hemoglobin A1c	M = 9.4%, SD =1.8	M = 9.0%, SD = 1.6
Teens—duration of diagnosis	M = 5.1 years, SD = 3.3	M = 5.6 years, SD = 3.4
Teens—insulin via injections or pumps	72% via injections	75% via injections
Parents	91% mothers	80% mothers
Parents' minimum education	95% high school	97% high school
Perceived advantages scale—teens		M =19.5, SD = 3.8
Perceived advantages scale—parents		M = 18.7, SD = 4.5
Perceived disadvantages scale—teens		M = 9.2, SD = 4.3
Perceived disadvantages scales—Parents		M = 10.0, SD = 4.2
Parental involvement		M =21.8, SD = 8.1
Adolescents' responsibility		M = 44.1, SD = 7.8
Conflicts—teens		M = 31.2, SD = 17.5
Conflicts—parents		M = 28.1, SD = 12.2
Attitude toward diabetes management—teens		M = 745.0, SD = 130.7
Attitude toward diabetes management—parents		M = 707.5, SD = 156.8

alpha coefficient if the item was deleted, and skewness of ≥1.0. These criteria were applied to both parent and adolescent versions, and 18 items were deleted, leaving 28 (14 advantages and 14 disadvantages). Cronbach alpha values ranged from .82 to .93 for both versions of the subscales.

Sample for Initial Testing

The sample was 100 parent–adolescent dyads (see Table I), representing a 65% participation rate (lack of time most frequent reason for declining). The size was chosen for logistical reasons in this initial testing. Estimates of sufficient sample size for factor analysis differ by experts (MacCallum, Wideaman, Zhang, & Hong, 1999); Kerlinger (1986) suggests 10 subjects per item, and after item analysis, our sample size for the five and four items in the scales was therefore sufficient. Factor analysis was further supported by the Bartlett Test of Sphericity results, indicating that the correlations did not happen by chance, and the Kaiser-Meyer-Olkin values (see Table II), indicating an adequate sample (Tabachnick & Fidell, 1989).

Parallel Parent and Adolescent Measures

Perceived Advantages and Disadvantages to Adolescents' Assumption of Diabetes Management

These scales measured the previously described perceptions (14 positive and 14 negative) to adolescents' assumption of diabetes management. Participants noted the degree to which they agreed or disagreed with the statements from 1 (*strongly disagree*) to 5 (*strongly agree*).

Attitude toward Adolescents' Assumption of Diabetes Management Responsibility

This is a semantic differential scale that consisted of nine items anchored by polar opposites (good/bad, safe/dangerous, important/unimportant, successful/failure, dishonest/honest, organized/disorganized, valuable/worthless, irresponsible/responsible, and easy/hard). For each item, participants rated their attitude toward adolescents assuming diabetes management on a scale from 0 to 100. Negative items were reverse-scored so that the higher scores reflected positive attitudes. Cronbach alphas were .88 (adolescent) and .89 (parent).

The Diabetes Responsibility and Conflict Scale

This scale consists of two 15-item subscales that measure (a) parent–adolescent conflict and (b) adolescents' responsibility or parental involvement related to insulin administration, glucose monitoring, meals, exercise, and discussion of diabetes with others (Rubin, Young-Hyman, & Peyrot, 1989). For the responsibility subscale, participants noted who (parent, adolescent, or both) does the tasks, with potential responses from 0 (*child all the time*) to 4 (*parent all the time*) and with the middle score reflecting parent half and child half of the time. These responses were coded so that respective parent and adolescent scores reflected higher parental involvement or higher adolescent responsibility levels. For the conflict subscales, participants noted the degree to which parents and adolescents argued/hassled about the diabetes tasks from 1 (*never*) to 5 (*all the time*). Cronbach alphas were between .79 and .96 in the study by Rubin et al. (1989) and between .81 and .97 in this study.

Results

Before analysis, data were examined for missing data, and item analysis was conducted. There was a list-wise deletion of missing data for item and factor analyses. Before computing the scale scores, missing values were imputed by computing the mean for the answered items for each individual. Missing values were imputed for the 4- and 5-item perception scales only when just one item was missed and for the other scales when <40% of items were missed. Following this process, descriptive statistics were calculated for the scales (see Table I). Item analysis, conducted according to criteria described previously, resulted in the deletion of 10 items from the advantages and 9 items from the disadvantages scales.

Principal component analysis yielded one factor (scree test and eigenvalues >1) for both scales and both parent and adolescent versions. The advantages items were related to parental relief from burden as well as adolescents' abilities and independence. The disadvantages items were related to parental loss of control, stress, and worry as well as adolescents' burden of responsibility. Table II delineates the values.

Reading levels (Flesch-Kincaid Grade Level via Microsoft Word) were 7.6 and 7.5 for the advantages and disadvantages scales, respectively, and when the words diabetes, insulin, injection, carbohydrates, and responsibility were deleted, reading levels were 5.1 and 5.6. Because this population was familiar with these diabetes-related words, they were retained. Responsibility was also retained because it was a word with which adolescents and parents are familiar based on previous focus group work (Hanna, unpublished data).

Pearson correlations examined relationships of perceived advantages and disadvantages to similar constructs

Table II. Factor Analysis for Parent and Adolescent Versions of Both Perceived Advantages and Disadvantages of Adolescents' Assumption of Diabetes Management Scales

	Eigenvalue		Variance (%)		Cronbach alpha		Loading	
Scale and items	Parents	Teens	Parents	Teens	Parents	Teens	Parents	Teens
Perceived advantages scale	3.046	2.684	61%	54%	.84	.78		
Teen independent watching carbohydrates							.825	.722
Teen successful managing diabetes							.820	.736
Parent(s) peace of mind—teen ready to take care of own diabetes							.767	.671
Easier for parent(s) to depend on teen to watch carbohydrates							.731	.846
Teen more control of life when responsible for exercising							.756	.674
Perceived disadvantages scale	2.502	2.527	63%	63%	.80	.80		
Parent(s) do not know if teen checking blood sugar							.706	.752
Hard when teen had more responsibility than other kids							.807	.791
Parent worried if teen remembering to give insulin							.784	.790
Remembering to check blood sugar was another thing for teen to worry about							.858	.844

Kaiser-Meyer-Olkin = .752 and .707 for the adolescent and .807 and .715 for the parent versions of the perceived advantages and the perceived disadvantages scales. The Bartlett Test of Sphericity = 129.201 ($p < .00$) and 129.106 ($p < .00$) for the adolescent and 188.862 ($p < .00$) and 129.468 ($p < .00$) for the parent versions of the perceived advantages and the perceived disadvantages scales, respectively.

and to the most proximal predicted outcomes. Attitudes were positively correlated with advantages ($r = .40$, $df = 95$, $p < .00$; $r = .39$, $df = 96$, $p < .00$) and negatively with disadvantages ($r = -.31$, $df = 96$, $p = .002$; $r = -.47$, $df = 97$, $p < .00$) for adolescents and parents, respectively. Parents were more involved when they perceived more disadvantages ($r = .22$, $df = 100$, $p = .025$); however, more perceived advantages were not significantly related to parental involvement. Adolescents were more likely to be responsible when they perceived more advantages ($r = .20$, $df = 98$, $p = .045$) and less responsible when they perceived more disadvantages ($r = -.27$, $df = 99$, $p = .006$). In addition, when parents perceived more disadvantages, they reported more conflict ($r = .28$, $df = 100$, $p = .006$), and when adolescents perceived more disadvantages, they also reported more conflict ($r = .29$, $df = 99$, $p = .004$).

Discussion

The advantages scales measure perceptions related to parental relief from burden as well as adolescents' abilities and independence, whereas the disadvantages scale perceptions were related to parental loss of control, stress, and worry as well as to adolescents' burden of responsibility. For this initial testing, these scales had acceptable psychometric properties and, as 4- and 5-item scales, are well suited for use with adolescents. Construct validity is supported by the relation of these perception scales to the attitude scale and in significantly predicting, for the most part, the proximal outcomes (adolescents' responsibility/parental involvement).

This study has limitations. Although our samples mirror the epidemiology of type 1 diabetes, which is predominately a disease of Caucasians (American Diabetes Association [ADA], n.d.), our sample may not represent all geographic regions, particularly where increasing incidence of diabetes (types 1 and 2) among African Americans has been reported (Libman et al., 1998; Oeltman, Addy, Liese, Mayer-Davis, & Heinze, 2003). In addition, this study's samples may not be representative: (a) on average, the adolescents had relatively good metabolic control; (b) the majority of these adolescents were living with two parents who had at least a high-school education; and (c) most of the parents were mothers. Testing of these scales with a larger, more diverse population and more inclusion of fathers is suggested.

Research and practice can benefit once the scales are further tested. A longitudinal study could determine how these perceptions change and how discrepancies contribute to parent–adolescent conflict and affect the transfer of responsibility and, subsequently, diabetes management. Such research holds the promise of promoting better understanding of parent–adolescent relationships which, in turn, can guide clinicians in developing interventions to promote successful transfer of responsibility.

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