Psychometric Findings for a Spanish Translation of the Diabetes Self-Management Profile (DSMP-Parent-Sp)

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OBJECTIVE — Few validated measures exist to evaluate self-management of diabetes in families with limited English proficiency. The present study evaluated the psychometric properties and the factorial equivalence of a Spanish translation of the parent report version of the Diabetes Self-Management Profile (DSMP-Parent-Sp).

RESEARCH DESIGN AND METHODS — Hispanic families of youth (mean 13.7 years old) with type 1 diabetes were recruited from three clinics in South Florida and represented a wide range of nationalities and acculturation levels. A total of 127 parents reported on their child's self-management behaviors using either the original DSMP-Parent (59.8%) or the DSMP-Parent-Sp (40.2%). In addition, youth reported their self-management using the original DSMP in English, and physicians rated their perceptions of the youth's self-management. Glycemic control was indexed by A1C in the past 3 months and collected from medical chart review.

RESULTS — Item analysis confirmed that the DSMP-Parent-Sp items related to the overall composite score in expected ways, and internal consistency estimates were adequate. Paired correlations demonstrated strong parent-child concordance and a significant relationship with physician perceptions of self-management. Evidence of concurrent and convergent validity, as well as "strict factorial invariance," was demonstrated.

CONCLUSIONS — These preliminary findings indicate that the DSMP-Parent-Sp is a reliable and valid parent report measure of the diabetes self-management behaviors of Hispanic youths. In addition, there is preliminary evidence that the translated measure may be considered equivalent to the original English measure when used to measure self-management in Hispanic youth with diabetes.

Diabetes Care 33:3–8, 2010

Hispanics make up the nation's largest minority group at ~15% of the total U.S. population (1). In addition, they are the fastest growing and youngest minority group in the U.S., with projections indicating that 133 million Hispanics will reside in the U.S. by the year 2050. There is corresponding evidence of an increase in the rate of type 1 diabetes among Hispanic youth in some U.S. cities (2), and diabetes is diagnosed in 13.8 of every 100,000 U.S. Hispanic children between 10 and 19 years of age (3). Despite their increasing numbers, Hispanic youth have been underrepresented in pediatric research (4) and, more specifically, in the type 1 diabetes literature. The dearth of data regarding this growing population exists in part because of a lack of validated measures available for families with limited English proficiency. The present study provides psychometric data on a Spanish translation of a parent report diabetes self-management measure that has significant potential to affect the literature in this area.

The existing diabetes literature points to the important role that parents play in diabetes care (5–7), and recent work suggests that Hispanic parents have a significant impact on youth's self-management (8). However, non–English-speaking individuals, especially parents, are often excluded from research in health care settings (9). Although there is evidence that Hispanic youth in the U.S. often develop English language skills rapidly, parents of Hispanic youth may have limited English proficiency (10). In addition to language barriers, Hispanic caregivers face multiple risk factors that may have an impact on their children's diabetes outcomes, including socioeconomic status and health literacy limitations (11). Therefore, it is important for pediatric diabetes researchers to overcome language barriers and find ways to incorporate Hispanic parents with limited English proficiency in their research and intervention initiatives.

It is especially important to include Hispanic families of youth with type 1 diabetes, given recent epidemiological data from the SEARCH for Youth with Diabetes Study Group (3), which illustrates the disproportionate health burden and poor glycemic control seen in U.S. Hispanic youth with type 1 diabetes. In addition, studies comparing Hispanic youth and adults with type 1 diabetes with their white, non-Hispanic counterparts have demonstrated significant disparities in both glycemic control and risk for long-term complications associated with diabetes (3,12,13). Given the disparities, researchers have called for further investigation targeting the underlying processes that lead to poorer outcomes in Hispanic youth (14). To date, only one published study has examined adherence in Hispanic youth with type 1 diabetes (12). In addition, no validated Spanish measures of diabetes self-management for parents have been described in the literature.

To address the current absence of Spanish diabetes self-management mea-

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Received 7 May 2009 and accepted 23 September 2009. Published ahead of print at http://care.diabetesjournals.org on 6 October 2009. DOI: 10.2337/dc09-0845.

sures, we have developed a Spanish translation of the Diabetes Self-Management Profile for parent (DSMP-Parent) report, the DSMP-Parent-Sp. The DSMP was originally developed and validated in a predominantly non-Hispanic, white sample (15). The most recent version of the measure includes both Conventional Regimen and Flexible Regimen Forms (16). The Flexible Regimen Form is a revision of the earlier Conventional Regimen Form developed for specific use with youth who are given regimens that include carbohydrate counting. In the present psychometric evaluation of the translation, we present preliminary findings on the psychometric properties of the DSMP-Parent-Sp and its equivalence to the original English DSMP-Parent. First, we examined the internal consistency of the measure. Second, to support the validity of the measure, we examined its relationship to other reports of youth self-management (i.e., child and physician report), as well as its relationship to youth's age and glycemic control. Based on previous findings, it was expected that parents' ratings of their child's self-management on the DSMP-Parent-Sp would be inversely associated with age, with older youth being reported to have poorer self-management. Parent ratings indicating better youth self-management were also expected to correspond with lower A1C levels in youth, reflecting better glycemic control. Finally, given the diversity that exists in the English proficiency of Hispanic families, it is important that the new measure can be used alongside the original English version. Therefore, we examined the equivalence of concepts in the DSMP-Parent-Sp and the original English measure through tests of factorial invariance.

RESEARCH DESIGN AND METHODS

— As part of a larger diabetes study, families were approached by research assistants during a routine visit at one of three pediatric specialty clinics. The requirements of the research study were described to both youth and their caregivers, and families were further screened for inclusion and exclusion criteria. After completing informed consent and assent procedures, a research assistant interviewed the caregiver and youth together for demographic information. Then, two trained research assistants, at least one of whom was fully bilingual, were available to complete the DSMP structured interviews with the caregiver and youth individually. Parent interviews took place in English or Spanish, depending on the caregiver's preference. All child interviews were conducted in English. Both parent and child interviews took ~20–30 min to complete, and families were not provided with any material incentive to participate. After the clinic visit, physicians reported on each child's prescribed regimen and their perception of the child's self-management. Medical chart review was used to collect data on glycemic control. This research protocol was approved by the university's institutional review board and the institutional review boards at each participating site.

Eligibility criteria included *1*) youth with type 1 diabetes disease duration of at least 12 months, *2*) primary diabetes care at one of three pediatric specialty clinics where recruitment was conducted, *3*) ethnicity identified as Hispanic by family, *4*) caregiver fluency in either English or Spanish, and *5*) child fluency in English (which limited the inclusion of six Hispanic families from the three pediatric specialties). The only exclusion criterion was the diagnosis of a concurrent medical condition, developmental disability, or psychiatric disorder that would be an obstacle in completing the structured interview. Nine families were excluded from the larger study based on this criterion primarily because of diagnoses of autism or Down syndrome. Of the 212 families who met the criteria and were approached, 12 families chose not to participate because of lack of interest, time restraints, or participation in other studies, making the participation rate of the larger study 94.3%.

Of the 200 families enrolled in the larger research study, there were 135 Hispanic caregiver-child pairs. Of these, 127 are included in the present study because they completed either the original English DSMP-Parent (n = 76, 59.8%) or the translated DSMP-Parent-Sp (n = 51, 40.2%). These caregivers were primarily biological mothers (83.5%) or fathers (14.2%) of youth with type 1 diabetes (53.5% female) aged between 10 and 17 years (mean ± SD 13.7 ± 2.10). Other caregivers (2.4%) included one stepmother, stepfather, and grandmother. Youth with type 1 diabetes were asked to complete the interview in the original English version to examine concordance between the parent translation and the original youth self-report measure. The 127 youth with type 1 diabetes who participated were a diverse group of Hispanic youth who were first-generation/foreign-born (14.2%), second-generation/U.S.-born with at least one foreign-born parent (53.5%), and third-generation or beyond/U.S.-born with both U.S.-born parents (30.7%). Children and adolescents who were born outside of the continental U.S. had lived in the U.S. from 2 to 13 years and were born in Cuba (47.4%), South America (26.3%), Puerto Rico (15.8%), Central America (5.3%), or Spain (5.3%). Spanish was the primary language spoken in the home of 48.8% of participants. The sample was also diverse in terms of parent's socioeconomic status and family composition. Families reported the following caregiver education levels: 6.5% had not completed high school, 64.5% had completed high school, 22.6% had at least one caregiver with a college education, and 6.5% had some graduate level studies. The median household annual income was $40,000, and 33.1% of the sample identified as living in a single-parent household. In terms of health insurance, 58.9% of families had public insurance covering some of the youth's diabetes care, 30.6% had private insurance, and 10.5% had no health insurance coverage.

The 127 youth in the current study had diabetes for a mean ± SD of 6.3 ± 3.6 years. Their standardized A1C was 8.5 ± 2.0%. However, there was a wide range of A1C (4.2–15.4%). Insulin pump therapy was prescribed for 25.8% of the youth in the present study. Of the 74.2% of youths for whom insulin injections were prescribed, insulin glargine (i.e., Lantus) was prescribed for 27.9%.

Instruments

Interview for sociodemographic and disease information. Research assistants interviewed caregivers and youth together to obtain information including the youth's age and sex, as well as parental educational attainment, occupation, and household income and whether they lived in a one- or two-parent home. In addition, information about countries of origin and the primary language spoken in their home was obtained. Caregivers were also asked about the youth's diagnosis month and year to calculate disease duration. Alternatively, for families that could not recall the exact month and year, medical chart review was used to determine disease duration.

Self-management. The DSMP (15) is a structured interview developed to assess self-management in youth with diabetes

over the past 3 months. Both the youth and parent versions of the interview have two forms: the DSMP Conventional Regimen Form and the DSMP Flexible Regimen Form (16). Research assistants interviewed both youth and caregivers individually using one of the two forms; the Flexible Regimen Form was only administered to participants whose prescribed regimen includes carbohydrate counting (i.e., youth for whom either insulin pump therapy or a basal/bolus insulin regimen with adjustment based on carbohydrate counting was prescribed). Each form consists of 25 items measuring one of 5 domains of self-management: exercise (3 items), management of hypoglycemia (4 items), diet (5 items), blood glucose monitoring (9 items), and insulin administration/dose adjustment (4 items). Of the questions, 21 are identical on both the Conventional and Flexible Regimen forms, with the remaining 4 items differing only by the mention of an insulin bolus.

The original validation of the measure by Harris et al. (15) revealed adequate internal consistency ($\alpha = 0.76$ for parents and adolescents), test-retest reliability ($r = 0.67$), and interrater reliability ($r = 0.94$) for the DSMP Conventional Regimen Form total score. The DSMP Flexible Regimen Form total score was also found to have adequate internal consistency ($\alpha = 0.70$ for parents and 0.65 for adolescents) by the DirecNet Study Group (16). In addition, scores on the DSMP, both Conventional and Flexible Regimen Forms, have had a significant negative relationship to glycemic control measured by A1C assay (Conventional $r = -0.28$; Flexible $r = -0.20$) (15,16). However, individual subscales making up the youth and parent DSMP forms have been demonstrated to have Cronbach α coefficients <0.50 and are not considered individually reliable (15).

Translation of the DSMP

The DSMP-Parent interview, both Conventional and Flexible Regimens, was translated for caregivers who preferred to respond to a Spanish language interview. The Spanish translation (DSMP-Parent-Sp) was created using an iterative process of forward and back translation by J.M.V. and M.C.F. in collaboration with a bilingual pediatric psychologist who was also a native Spanish speaker. This process was used to promote the continued face and content validity of the measure after translation. All three translators had considerable experience conducting research with children and adolescents with type 1 diabetes and were familiar with the DSMP interview. Because of differences in language across different Hispanic nationalities, it was advantageous that translators represented two of the largest subgroups in the present study (Cuban and South American nationalities). In addition to this iterative process, a certified Spanish-language translator reviewed and provided feedback at multiple time points to improve the translation's fluency and grammar.

Prescribed regimen and physician ratings

Physicians completed a brief instrument that asked about every aspect of prescribed treatment in type 1 diabetes (e.g., type of insulin and number of injections). The instrument was developed by modifying an existing measure, the Prescribed Treatment Plan, designed in a cystic fibrosis population and previously modified for use in asthma (17).

Physicians were also asked to rate their perceptions of the youth's self-management on eight items. Six of the items targeted specific self-care behaviors: *1*) administration of injections/boluses, *2*) frequency of blood glucose testing, *3*) adjustment of insulin, *4*) following a prescribed diet, *5*) management of hypoglycemia, and *6*) clinic attendance. Physicians rated the youth's management on each of these items from 1 ("poorest 5% of youth with diabetes") to 5 ("best 5% of youth with diabetes") with 3 representing "about average." In addition, physicians rated two global adherence items (i.e., "Overall, this youth adheres well to the prescribed regimen" and "Overall, this child is capable of adhering to a complex regimen") responding on a scale from 1 = strongly disagree to 5 = strongly agree (with 3 = neutral) to each item. The average of these eight items is used in the present study as a measure of physician's perceptions of self-management, with higher scores indicating better perceived self-management. Internal consistency in the present sample was excellent (Cronbach $\alpha = 0.95$).

Glycemic control

The most recent A1C value within 3 months of each participant's recruitment date was obtained using medical chart review at each of the recruitment sites. Assays varied at the three different clinics and for the different laboratories used by participants' private insurance companies. The upper limit of normal for these assays ranged from 6.0 to 6.4. Therefore, A1C values were converted to standard scores so that they could be analyzed and compared across participants. Specifically, following procedures in other studies (18), the upper limit of normal for each assay was subtracted from the participant's A1C value; the result was then divided by the assay's upper limit of normal.

Data analysis

Student *t* tests were first conducted to examine any differences in disease variables that may have existed between families in which parents completed the original English DSMP-Parent and those in which parents completed the DSMP-Parent-Sp. Then, several analyses were conducted to address the primary study goals. First, internal consistencies of the original DSMP-Parent and DSMP-Parent-Sp were evaluated using Cronbach α coefficients, and item-total correlations were computed. Second, concurrent validity was examined by calculating Pearson correlation coefficients for the DSMP-Parent-Sp total score and both youth's age and A1C. In addition, convergent validity was examined by calculating paired Pearson correlation coefficients for the DSMP-Parent-Sp total score and both youth report on the original DSMP and physician perceptions of youths' self-management. Finally, a combination of exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and multigroup CFA was used in the present study to evaluate factorial invariance of the new DSMP-Parent-Sp. Initially, EFA was used because there is only one study to date that has examined the factor structure of the DSMP, and that study consisted of a largely white, non-Hispanic sample (19). Overall, these analyses are considered preliminary because of the small sample size available. Analyses were performed with Mplus 5.2 (20). The estimation procedure used throughout the analyses was weighted least-squares estimation with delta parameterization. Two multigroup models were tested using definitions from Meredith (21): *1*) "strong factorial invariance" where factor loadings, intercepts, and thresholds are fully invariant and *2*) "strict factorial invariance" where, in addition to the three parameter estimates above, residual variances of the indicators are fully invariant.

Table 1—*Descriptives by parent's preferred language for DSMP*

	English	Spanish
n	76	51
Health insurance status		
Private insurance	28 (37.8)	10 (20.0)
Public insurance	42 (56.8)	31 (62.0)
No insurance	4 (5.4)	9 (18.0)
Generational status		
First-generation/foreign-born	3 (4.0)	15 (30.0)
Second-generation	35 (46.7)	33 (66.0)
Third-generation and beyond	37 (49.3)	2 (4.0)
DSMP interview form completed		
Conventional Regimen Form	33 (43.4)	22 (43.1)
Flexible Regimen Form	43 (56.6)	29 (56.9)
Child's age in years	13.62 ± 2.18	13.78 ± 2.00
Mother's highest grade*	4.92 ± 1.14	4.84 ± 1.16
Household income (USD)†	77,188 ± 80,817 (median 60,000)	40,049 ± 47,651 (median 25,000)
Duration of diabetes (years)	6.40 ± 3.63	6.25 ± 3.61
Standardized A1C (%)‡	0.45 ± 0.34	0.40 ± 0.32
Parent report DSMP total	59.99 ± 12.34	59.64 ± 12.81
Youth report DSMP total	59.31 ± 12.18	58.55 ± 10.49

Data are *n* (%) or means ± SD. *Mother's highest grade is presented in Hollingshead categories ranging from 1 to 7 with 1 equal to <8th grade education and 7 equal to graduate training (e.g., 5 is equivalent to some college or vocational training). †The median is provided for household income because of significant skewness. ‡A1C is standardized as follows (A1C score − upper limit of normal)/upper limit of normal.

RESULTS

Descriptive statistics

Means ± SD for youth's age, mother's highest grade of school, household income, diabetes duration, standardized A1C, and youth and parent report of self-management were calculated separately for families where caregivers completed the original DSMP and those that completed the DSMP-Parent-Sp (Table 1). In addition to the mean ± SD for household income, the median is provided, given that household income was significantly positively skewed in the present sample (skewness ± SEM 3.44 0.22; kurtosis 14.85 ± 0.44). Finally, Table 1 also provides information about the frequency and percentage of families at each level of health insurance status (private, public, or no insurance), youth generational status (first-, second-, or third-generation and beyond), and regimen classification for the DSMP forms (Conventional Regimen or Flexible Regimen). Mean diabetes self-management scores were not significantly different [parent report, $t(124) = 0.15$, NS; youth report, $t(117) = 0.35$, NS]. In addition, the two groups did not differ on any disease-related variables measured (i.e., disease duration, insulin regimen, or A1C). As would be expected, the groups do differ across specific sociocultural variables including the youth's generational status, health insurance status, and household income.

Reliability and validity estimates

Item-total correlations were calculated separately for each of the 25 parent report items across both the DSMP-Parent and the DSMP-Parent-Sp. All item-total correlations were in the expected directions. They ranged from 0.12 to 0.62 (0.41 ± 0.12) in the original DSMP-Parent and from 0.05 to 0.72 (0.41 ± 0.16) in the DSMP-Parent-Sp. Cronbach α coefficients were acceptable at 0.76 for the original DSMP-Parent and at 0.80 for the DSMP-Parent-Sp. Internal consistencies for the five parent report subscales ranged from 0.36 to 0.71 in the present sample. These five subscales were not internally reliable in the original measure and are not meant for individual subscale interpretation (15).

Pearson correlations were calculated to examine associations between parent report on the DSMP-Parent ratings (both English and Spanish versions) and youth's age and A1C, physician perceptions of adherence, and youth DSMP self-report as evidence for concurrent and convergent validity. The original DSMP-Parent was significantly related to all of these variables in the expected directions. Older youth ($r = -0.31$, $P < 0.01$) and youth with higher A1C values ($r = -0.38$, $P < 0.01$) had lower DSMP-Parent scores. Higher scores on both physician perceptions of adherence ($r = 0.40$, $P < 0.01$) and youth report of self-management ($r = 0.74$, $P < 0.01$) were related to higher scores on the DSMP-Parent report. Similarly, the DSMP-Parent-Sp was significantly related to both youth report on the original DSMP ($r = 0.65$, $P < 0.01$) and physician perceptions of adherence ($r = 0.29$, $P < 0.05$) in the expected direction. However, it was not significantly related to youth's age ($r = -0.19$, NS) or A1C level ($r = -0.31$, NS), although the magnitude of the latter relationship was similar to that found with the original DSMP-Parent and also similar to the original validation of the DSMP measure (15,16).

Preliminary examination of factor invariance

EFAs were conducted separately for the original DSMP-Parent and the DSMP-Parent-Sp. These analyses resulted in scree plots indicating a possible three-, four-, or five-factor structure. Geomin rotation (oblique) solutions did not reveal a clear interpretation. At this point, a binary item from the hypoglycemia subscale was dropped from further analysis, given its limited variability among parents who completed the DSMP-Parent-Sp (96.1% reported that they kept something handy in case of a low blood glucose level).

Given our inability to determine a baseline factor structure using EFA, CFAs were conducted to examine an "a priori" five-factor structure, which consisted of each subscale identified as a factor. Two factors, the hypoglycemia and blood glucose testing subscales, were highly correlated and resulted in a Heywood case (i.e., a correlation estimated at >1.00). Therefore, a four-factor solution was examined, combining these two factors. In the case of the Spanish translation, the residual variance of one of the items in the exercise subscale was negative. Because this parameter was not significantly different from zero, it was constrained to be zero in the Spanish translation model. The model then converged and the resulting baseline model had good overall fit for both the original DSMP-Parent [$\chi^2(37) = 46.29$, $P = 0.14$; root mean-square error of approximation (RMSEA) = 0.05] and the DSMP-Parent-Sp items [$\chi^2(29) = 26.36$, $P = 0.61$; RMSEA = 0.00].

Multigroup CFA was conducted to examine factor invariance. Model fit was good [$\chi^2(63) = 56.92$, $P = 0.69$; RMSEA = 0.00] when factor loadings, intercepts, and thresholds were constrained to be equal across groups. In addition, model fit did not significantly worsen when residual variances of the indicators were constrained to be equal across groups [DIFFTEST analysis: $\Delta\chi^2(16) = 14.95$, $P = 0.53$], suggesting "strict factorial invariance" of the factors examined in the present study.

CONCLUSIONS — The present study provided preliminary support for the reliability, concurrent and convergent validity, and factor invariance of DSMP-Parent-Sp for use with parents with limited English proficiency. Support for internal consistency was revealed by an acceptable Cronbach α coefficient for parent and youth reports, as well as by the directions and means of item-total correlations.

Preliminary support for criterion-related validity with A1C was demonstrated with a moderate correlation similar to that found in the English version and similar to the original published relationship with a largely white, non-Hispanic sample (15). However, this relationship did not meet statistical significance in the present sample and needs to be examined in a larger sample of Hispanic families. Of note, the DSMP-Parent-Sp, completed by parents who preferred a Spanish language interview, was not related to youth's age in the present sample. The limited data available on Hispanic youth with type 1 diabetes make it to interpret this finding. This finding may reflect differences in the developmental trajectory of adherence in Hispanic families, particularly those with limited English proficiency and possibly less acculturation to U.S. culture. This finding is consistent with that of Streisand et al. (22), who examined the relationship between age and various aspects of self-management using 24-h recall interviews in Puerto Rico. As in the present study, they found no relationship between age and self-care behaviors including injection regularity, injection-meal timing, or glucose testing frequency in their Hispanic sample.

As described by Weinger et al. (23), this study and others are limited by the "lack of a 'gold standard' comparison" for self-management behaviors. However, support for concurrent validity was provided by examination of relationships with youth report on the original English measure as well as physician perceptions of self-management. High concordance with youth self-report was found for the translated measure as expected based on earlier published studies of the original DSMP (15,16). In addition, the parent report DSMP-Parent-Sp measure was significantly related to a brief scale measuring physician perception of self-management. Future researchers should further examine the validity of the measure using multiple methods, including recall interviews, electronic monitoring of blood glucose testing, and brief reports on paper-and-pencil measures such as the Self Care Inventory (24,25).

Although forward and back translation were used to maintain semantic equivalence, demonstration of factorial invariance was necessary to achieve conceptual equivalence, evidence that a measure continues to capture the intended construct (26). Equivalence of these measures would allow for comparisons across Hispanic youth whose caregivers complete the Spanish translation as well as those who complete the original English measure, which is important given the diversity in the English fluency of U.S. Hispanic caregivers. Despite the limited sample size available, we found preliminary support for strict factorial invariance, suggesting that concepts in the original and Spanish versions of the DSMP-Parent have similar meanings for Hispanic caregivers. Replication of this finding with larger samples is needed, given the difficulty in replicating factor structures that were found with a small sample size. Further, although the utility of the translated measure is promising, continued psychometric evaluation of this translation is needed to demonstrate that "self-management" indeed carries the same cultural meaning in English and Spanish. This may be accomplished through cognitive interviewing, pilot testing, and focus groups.

Our sample size limits our discussion of the variability that exists between different Hispanic subgroups (e.g., those with varying acculturation, as well as those who identify different nationalities and countries of origin). The scope of the present study did not allow for tailoring of the measure's translation or examination of the translation's validity across multiple Hispanic subgroups. In addition, families with a Spanish-language preference and those with an English language preference varied across multiple sociocultural factors. Additional research is needed to further examine the DSMP-Parent-Sp with Hispanic subgroups underrepresented in our sample.

Given the scarce number of validated diabetes self-management measures available in Spanish, the DSMP-Parent-Sp provides an important alternative to assist researchers in systematically assessing self-management in Hispanic youth with type 1 diabetes. The findings of this preliminary study suggest that the DSMP-Parent-Sp upholds the validity and reliability of its English counterpart and will be a valuable tool for much needed research in this population.

Acknowledgments — This project was supported by National Institutes of Health Training Grants F31-DK-072580 and T32-HD-07510.

No potential conflicts of interest relevant to this article were reported.

We express appreciation to the health care providers who supported this research, including Drs. Sanchez, Gonzalez-Mendoza, Richton, and Motzkin-Kava. We also thank the families who contributed their valuable time and Dr. Jessica Rios-Habib for her efforts in development of the DSMP-Parent-Sp.

References

1. CB08-FF. 15 Press release: Hispanic Heritage Month 2008 [article online], 2008. Available from http://www.census.gov/Press-Release/www/releases/archives/facts_for_features_special_editions/012245.html. Accessed 7 February 2009
2. Vehik K, Hamman RF, Lezotte D, Norris JM, Klingensmith G, Bloch C, Rewers M, Dabelea D. Increasing incidence of type 1 diabetes in 0- to 17-year-old Colorado youth. Diabetes Care 2007;30:503–509
3. Lawrence JM, Mayer-Davis EJ, Reynolds K, Beyer J, Pettitt DJ, D'Agostino RB Jr, Marcovina SM, Imperatore G, Hamman RF, the SEARCH for Diabetes in Youth Study Group. Diabetes in Hispanic American youth: prevalence, incidence, demographics, and clinical characteristics: the SEARCH for Diabetes in Youth Study. Diabetes Care 2009;32:S123–S132
4. Walsh C, Ross LF. Are minority children under- or overrepresented in pediatric research? Pediatrics 2003;112:890–895
5. Ellis DA, Podolski CL, Frey M, Naar-King S, Wang B, Moltz K. The role of parental monitoring in adolescent health outcomes: impact on regimen adherence in youth with type 1 diabetes. J Pediatr Psychol 2007;32:907–917
6. Wysocki T, Harris MA, Buckloh LM, Mertlich D, Lochrie AS, Taylor A, Sadler

M, White NH. Randomized, controlled trial of Behavioral Family Systems Therapy for Diabetes: maintenance and generalization of effects on parent-adolescent communication. Behav Ther 2008;39: 33–46
7. Weissberg-Benchell J, Nansel T, Holmbeck G, Chen R, Anderson B, Wysocki T, Laffel L, the Steering Committee of the Family Management of Diabetes Study. Generic and diabetes-specific parent-child behaviors and quality of life among youth with type 1 diabetes. J Pediatr Psychol 2009;34:977–988
8. Hsin O, La Greca AM, Valenzuela JM, Moine CT, Delamater AM. Adherence and glycemic control among Hispanic youth with type 1 diabetes: role of family involvement and acculturation. J Pediatr Psychol. 26 October 2009 [E-pub ahead of print]
9. Frayne SM, Burns RB, Hardt EJ, Rosen AK, Moskowitz MA. The exclusion of non-English-speaking persons from research. J Gen Intern Med 1996;11:39–43
10. Weisskirch RS, Alva SA. Language brokering and the acculturation of Latino children. Hisp J Behav Sci 2002;24:369–378
11. Sanders LM, Federico S, Klass P, Abrams MA, Dreyer B. Literacy and child health: a systematic review. Arch Pediatr Adolesc Med 2009;163:131–140
12. Gallegos-Macias AR, Macias SR, Kaufman E, Skipper B, Kalishman N. Relationship between glycemic control, ethnicity and socioeconomic status in Hispanic and white non-Hispanic youths with type 1 diabetes mellitus. Pediatr Diabetes 2003; 4:19–23
13. Kirk JK, Passmore LV, Bell RA, Narayan KM, D'Agostino RB Jr, Arcury TA, Quandt SA. Disparities in A1C levels between Hispanic and non-Hispanic white adults with diabetes: a meta-analysis. Diabetes Care 2008;31:240–246
14. Flores G, Fuentes-Afflick E, Barbot O, Carter-Pokras O, Claudio L, Lara M, McLaurin JA, Pachter L, Ramos-Gomez FJ, Mendoza F, Valdez RB, Villarruel AM, Zambrana RE, Greenberg R, Weitzman M, Gomez FJ. The health of Latino children: urgent priorities, unanswered questions, and a research agenda. JAMA 2002; 288:82–90
15. Harris MA, Wysocki T, Sadler M, Wilkinson K, Harvey LM, Buckloh LM, Mauras N, White NH. Validation of a structured interview for the assessment of diabetes self-management. Diabetes Care 2000;23: 1301–1304
16. Diabetes Research in Children Network (DirecNet) Study Group. Diabetes self-management profile for flexible insulin regimens: cross-sectional and longitudinal analysis of psychometric properties in a pediatric sample. Diabetes Care 2005; 28:2034–2035
17. Quittner AL, Espelage DL, Ievers-Landis C, Drotar D. Measuring adherence to medical treatments in childhood chronic illness: considering multiple methods and sources of information. J Clin Psychol Med Settings 2000;7:41–54
18. Nansel TR, Iannotti RJ, Simons-Morton BG, Cox C, Plotnick LP, Clark LM, Zeitzoff L. Diabetes personal trainer outcomes: short-term and 1-year outcomes of a diabetes personal trainer intervention among youth with type 1 diabetes. Diabetes Care 2007;30:2471–2477
19. Lewin A, Storch EA, Geffken GR, Heidgerken AD, Williams LB, Silverstein JH. Further Examination of a structured adherence interview of diabetes for children, adolescents, and parents. Children's Health Care 2005;34:149–164
20. Muthén LM, Muthén BO. *Mplus User's Guide*. Los Angeles, Muthén & Muthén, 1998–2007
21. Meredith W. Measurement invariance, factor analysis, and factorial invariance. Psychometrika 1993;59:525–543
22. Streisand R, Respess D, Overstreet S, Gonzalez de Pijem L, Chen RS, Holmes C. Brief report: Self-care behaviors of children with type 1 diabetes living in Puerto Rico. J Pediatr Psychol 2002;27: 759–764
23. Weinger K, Butler HA, Welch GW, La Greca AM. Measuring diabetes self-care: a psychometric analysis of the Self-Care Inventory–Revised with adults. Diabetes Care 2005;28:1346–1352
24. La Greca AM. *Brief Manual for the Self Care Inventory*. Miami, Author, 1992
25. Lewin AB, LaGreca AM, Geffken GR, Williams LB, Duke DC, Storch EA, Silverstein JH. Validity and reliability of adolescent and parent rating scale of type 1 diabetes adherence behaviors: the Self Care Inventory (SCI). *J Pediatr Psychol* 2009;34:999–1007
26. Behling O, Law K. *Translating Questionnaires and Other Research Instruments: Problems and Solutions*. Newbury Park, CA, Sage Publications, 2000