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Evaluation of the Spoken Knowledge in Low Literacy in Diabetes Scale for Use With Mexican Americans

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Abstract

Purpose—This article evaluates the Spoken Knowledge in Low Literacy in Diabetes (SKILLD) questionnaire, a measure of essential knowledge for type 2 diabetes self-management, after it was modified for English- and Spanish-speaking Mexican Americans.

Method—We collected surveys (SKILLD, demographic, acculturation) and blood for A1C analysis from 72 community-recruited participants to analyze the SKILLD's internal consistency, interrater reliability, item analysis, and construct validity. Clinical experts evaluated content validity.

Results—The SKILLD demonstrated low internal consistency but high interrater reliability and content and construct validity. There were significant correlations in expected directions between SKILLD scores and acculturation, education, and A1C and significant differences in SKILLD scores between and within groups after an educational intervention and between high- and low-accultured participants.

Conclusion/Implications—The SKILLD generates useful information about Mexican Americans' diabetes knowledge. Lower SKILLD scores suggest less diabetes knowledge, lower health literacy, and participants' difficulties understanding items. Further modifications should improve use with low-accultured Mexican Americans.

Keywords

transcultural health; survey design; type 2 diabetes mellitus; Latino

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Introduction

For optimal health people with type 2 diabetes (T2DM) should actively engage in health care decision-making, problem-solving, and day-to-day diabetes self-management (Funnel et al., 2012). Diabetes self-management regimens frequently require patients to self-monitor blood glucose levels and interpret those values in the context of symptoms, diet, and physical activity; determine the nutritional content of foods; and take medications as prescribed. To make accurate interpretations of all these data, people must have “the ability to perform basic reading and numerical tasks required to function in the health care environment” (American Medical Association, 1999). In other words, they must be functionally health literate (Cavanaugh et al., 2008; Schillinger et al., 2002).

A low level of health literacy is a significant barrier to diabetes management (Britigan & Rojas-Guyler, 2009; Schillinger et al., 2002). For instance, people with low health literacy likely cannot name their medications or state the medication’s purpose (Cavanaugh et al., 2008) and they have more difficulty than those with functional health literacy in following a recommended diet and exercise regimen (Persell et al., 2004). Low health literacy in combination with low diabetes knowledge can result in more than the usual challenges to learning diabetes self-management skills. As a result, patients with low health literacy may not master the diabetes-related knowledge needed for effective diabetes self-management (Heisler, Piette, Spencer, Kieffer, & Vijan, 2005; Ishikawa, Takeuchi, & Yano, 2008; Rothman et al., 2004).

Low health literacy can lead to worse diabetes outcomes, such as higher levels of A1C (Cavanaugh et al., 2008; Powell, Hill, & Clancy, 2007). Furthermore, low health literacy has been a significant predictor of worse A1C levels and poor glycemic control even after statistically controlling for education level, previous diabetes education, and several other demographic characteristics (Schillinger et al., 2002). Conversely, a functional level of health literacy alleviates the influence of low education on poor glycemic control (Schillinger, Barton, Karter, Wang, & Adler, 2006).

Low health literacy has an even greater impact among Hispanics, of whom 65% are classified as having less than basic health literacy compared with only 28% of Whites (U.S. Department of Health and Human Services [USDHHS], 2008). Hispanics also have lower educational levels, are less likely to seek health care (Centers for Disease Control and Prevention [CDC], 2009), or to be effectively treated by a physician because of language barriers and lack of insurance (CDC, 2004). Furthermore, Hispanics are diagnosed with diabetes at 1.5 to 2 times the rate of non-Hispanic Whites (11.8% vs. 7.1%; USDHHS, 2011) and have higher rates of diabetes-related complications and mortality (Agency for Healthcare Research and Quality, 2001). In the context of these broad social and health disparities, health literacy may be the key to improving Hispanics’ diabetes care and outcomes.

Because patients may perceive direct measurement of their health literacy as burdensome, intrusive, or insulting, clinicians and researchers are more apt to measure their patients’ knowledge about diabetes. Knowledge is often used as a proxy measure of literacy. To

determine diabetes knowledge in African American patients with known low literacy, Rothman and colleagues developed the Spoken Knowledge in Low Literacy in Diabetes (SKILLD) questionnaire (Rothman et al., 2005). The purpose of this article is to evaluate the SKILLD as adapted and piloted with English- and Spanish-speaking Mexican Americans.

Method

Design

This instrumentation study analyzes psychometric properties of and data generated by the SKILLD using data that were collected as part of a randomized controlled trial in which the SKILLD was used to measure diabetes knowledge.

Sample and Setting

The study was conducted in a mid-sized city and its adjacent suburban and rural areas where Hispanics compose about one third of the population. Power analysis conducted for the larger study determined that a total sample size of 60 would be ample to detect changes ranging from 13% to 18% (based on previous studies) in A1C before and after an intervention, with a two-tailed test and 80% power. Allowing for 20% attrition for the larger intervention study, we enrolled 72 participants. A convenience sample of adult Mexican Americans with type 2 diabetes was recruited from several community settings including outpatient clinics, an email list serve for Mexican American women, a university worksite, and health fairs. Participants were enrolled if they self-identified as Mexican American, were aged 25 to 75 years, and had been diagnosed with type 2 diabetes. Participants were excluded if they were being treated with dialysis, were currently or recently pregnant, had cancer, or were receiving or recently received cancer treatments.

Participants were randomly assigned to an 8-week educational intervention or to a waitlisted control group. Registered nurses administered the intervention consisting of weekly educational sessions in the participants' homes using a curriculum that addressed an array of topics important to diabetes symptom self-management (e.g., glucose testing, nutrition, activity, stress management, medications, pain management) designed for the larger parent study.

Data Collection Procedures

After institutional review board approval of the study protocol, recruits were informed about the study in their preferred language (Spanish or English) and gave their signed consent to participate. Trained, bilingual nursing students administered questionnaires during one-on-one interviews and recorded the participants' responses. The in-home data collection sessions were held at baseline and again 9 weeks later. Fasting plasma blood samples were obtained during the same visits.

Instruments

Data for these analyses were obtained using three questionnaires: the SKILLD, the Acculturation Scale for Mexican Americans (Marín & Marín, 1991), and a form developed for this study to capture demographic characteristics. The SKILLD and demographic form

were translated using forward–backward translation methods (Jones, Lee, Phillips, Zhang, & Jaceldo, 2001) in which the questionnaires were first translated into Spanish by a bilingual nurse who is a native Spanish speaker. Then the questionnaires were back-translated into English by a different bilingual native Spanish-speaking nurse. The two translators and the first author met to resolve discrepancies in both English (original and back-translated) versions, which resulted from stylistic rather than conceptual translations to Spanish and English. The result was a Spanish version of the SKILLD that is culturally and functionally congruent with a derived etic perspective, meaning that it is relevant to insider (lay Mexican American patients) and outsider (researcher and clinician) perspectives (Jones et al., 2001). All items were used. See Table 1 for both sets of translated items.

The SKILLD is composed of 10 open-ended questions, which ask about symptoms of high and low glucose levels, normal levels of diabetes lab tests, and activities to prevent long-term complications. Rothman et al. (2005) designed the SKILLD to measure core knowledge necessary for type 2 diabetes self-management among African American patients with low health literacy. The SKILLD uses an interview to ask questions with open-ended response format, which may be less burdensome for people with low literacy over close-ended response formats such as multiple choice or true-false questions. Rothman et al. tested the SKILLD with a sample of African Americans in the southeast United States. They reported that the SKILLD achieved a Cronbach's α of .72 and that factor analysis yielded loadings on one factor, implying the SKILLD is composed of a single dimension of diabetes knowledge (Rothman et al., 2005).

To score the SKILLD, responses are compared with an answer key and coded as correct or incorrect. Coded scores are tallied for a total score that may range from 0 to 10 (Rothman et al., 2005). The correct responses provided in Rothman et al.'s answer key are worded using medical terminology. For this study, the authors modified the SKILLD answer key to incorporate responses given by respondents in colloquial English and Spanish. For example, the original answer for Item 5, which asks the rationale for examining feet, was "morbidity due to neuropathic/immunologic consequences." The answer key was changed to include "feet get damaged" and "feeling/sensation changes" (see Table 1) based on responses obtained in pretesting.

The Acculturation Scale for Mexican Americans, in English and Spanish versions, contains 4 items that inquire about the respondents' use of English and Spanish on a 5-point rating scale (Marín & Marín, 1991). Total acculturation scores range from 4 to 20, with higher scores indicating a higher level of acculturation in relation to speaking English in various settings. Evidence of validity includes high correlations among familial generation in the United States, time living in the United States, and participants' self-evaluation of acculturation (Marín & Marín, 1991). For this sample, the scale demonstrated high reliability ($\alpha = .95$). Sex, age, and years of formal education were recorded on a form developed for this research study. A commercial laboratory analyzed venous blood samples for A1C using immunoturbidimetry (Roche Integra 7000); A1C reference value was $< 6.0\%$.

Statistical Analysis

Raw data were entered into a PASW (SPSS) v.18 database for management and evaluation. Descriptive statistics (frequency, mean, standard deviation) were calculated to describe the sample. Three master's-prepared nurses separately scored the SKILLD using the answer key that was modified for this study. Aspects of the SKILLD's reliability were assessed by internal consistency (Cronbach's alpha, item analysis) and the scorers' interrater reliability (intra-class correlation coefficient [ICC]). To evaluate validity, evidence of content validity, construct validity, and usefulness of the data were examined.

Content validity was assessed using Lynn's (1986) method of calculating content validity index (CVI). Five certified diabetes nurse educators with experience educating Mexican American patients with T2DM served as content raters. The content raters were asked to rate each question, including probing questions, and the corresponding answer key using a 4-point scale: (1) not relevant, (2) possibly relevant after major revision, (3) relevant needing minor revision, and (4) relevant, needing no revision. Their ratings were used to calculate the CVI. CVI values can range from 0 to 1, with those closer to 1 representing consensus that the content of each of the individual items and the overall scale is valid.

Construct validity was assessed by bivariate correlations between total SKILLD scores, years of education, and A1C values. Significant positive correlations between SKILLD scores and years of education and acculturation level and negative correlations between A1C level and total SKILLD score would indicate that the SKILLD scores were related to social constructs and diabetes control in the expected direction.

Because acculturation was not normally distributed in the sample (the distribution was U-shaped with most of the sample having fairly low or fairly high acculturation and few having a medium level), a dichotomously measured variable was created using median split. Scores below the median indicated low acculturation and scores at and above the median score indicated high acculturation. The relationship between the new dichotomously measured acculturation variable and total SKILLD score was analyzed with a point-biserial correlation. The difference in mean total SKILLD scores between those of high and low acculturation was analyzed using an independent *t* test. Chi squares were used to analyze the association between acculturation level (high or low) and score (correct or incorrect) of each of the ten SKILLD items. Frequencies were used to determine which of the SKILLD items were answered correctly or incorrectly by most of the sample.

Construct validation of the SKILLD was also assessed by comparing experimental and waitlisted group scores before and after the intervention. A one-between factor and one-within-factor repeated-measures design was employed. The between-factor variable was randomized group with two levels (experimental and control). The within-factor variable was time, also with two levels (baseline and 9 weeks). A two-by-two repeated measures analysis of variance was performed to test whether participants who received the 8-week diabetes educational intervention scored higher on the SKILLD at the second data collection than the control group, which would indicate the SKILLD was sensitive to changes in diabetes knowledge level and therefore demonstrated construct validity.

Results

Data were collected from 72 participants who were mostly female, middle aged, and of relatively low acculturation (although participants provided a full range of possible scores). Mean A1C levels were 8.5%, substantially above the American Diabetes Association (2012) recommendation of 7% or less (see Table 2).

Reliability

Cronbach's alpha was low at .64. Interitem correlations ranged between .004 and .536. Item-to-total correlations ranged from .051 to .481. Interrater reliability among the three nurses who scored the SKILLD items as correct or incorrect, as measured by ICC, ranged between .54 and 1.00 for each SKILLD item; the overall ICC was .86.

Validity

Content Validity—The five content experts consistently rated the SKILLD items at 3 (needed minor changes) or 4 (needed no changes). The content ratings resulted in a calculated CVI of 1.00. The experts suggested slight changes in items phrasing but not to the actual content of the items.

Construct Validity—SKILLD scores were negatively weakly correlated with A1C ($r = -.278, p = .029$) and positively moderately correlated with years of education ($r = .470, p < .001$) and acculturation ($r = .515, p < .001$). There were significant associations between acculturation level and correct score on 7 of the 10 individual SKILLD items (see Table 3). People of high acculturation responded correctly to more items. There was a significant difference in total SKILLD score for people of high and low acculturation (4.06 vs. 6.29, $t = 4.885, df = 66, p < .001$).

Experimental and control group scores on the SKILLD were compared at baseline and at 9 weeks using a two-by-two repeated-measures analysis of variance to determine construct validation of the instrument. The group-by-time interaction effect was statistically significant, $F(df = 1, 47) = 4.633, p = .037$. There were no significant differences between the experimental and control groups at baseline, $t(68) = -0.70, p = .48$. However, at 9 weeks the two groups differed significantly, $t(37.5) = -2.92, p = .006$, and showed higher SKILLD scores for the experimental group.

Diabetes Knowledge Measured

Examination of participants' responses to the SKILLD revealed that the level of baseline diabetes knowledge was moderate at 5.6 points (range 0–10). Item 3 (pertaining to treatment for low blood glucose) was the item answered correctly by the most respondents. Item 7 (pertaining to the range of normal glucose levels) was the item answered incorrectly by the most respondents.

A majority of participants responded incorrectly to questions that asked for a two-part answer. Fewer than half of the sample responded correctly to Items 7 and 9. Item 7, which asked for the range of normal blood glucose, had the lowest correct response rate. It was

answered correctly by only 12% of respondents in both high and low acculturation groups. About one third of the incorrect responses to this question were incorrect because they supplied only one glucose value, not the two needed to show the normal range. Twenty-eight percent of answers were incorrect because values were too high. Item 9 asked how often and also for how long one should exercise each week. Most of the incorrect responses were those in which participants failed to respond correctly to both parts of the question. Item 8, which asked for a normal A1C level, was answered correctly by only 32% respondents. Most of incorrect responses to Item 8 were “I don’t know.” Other incorrect responses to Item 8 gave a number that was more representative of blood glucose than A1C level; for example, one participant answered “120.”

Comparison by Acculturation Level

There were significant associations between acculturation level and correct response to 6 of the 10 SKILLD items. Significantly more participants of low acculturation responded incorrectly to Items 1, 2, 4, 6, 8, and 10. Item 1 asked for symptoms of high blood glucose and Item 2 for symptoms of low blood glucose. While over half of participants of high acculturation levels responded correctly to these items, only 26% of participants in the low acculturation group answered Item 1 correctly and 24% answered Item 2 correctly. Their responses often gave symptoms that were appropriate for the opposite condition. Item 4 asked how often one should perform foot care. Low acculturated respondents tended to report that foot care should be performed less frequently than the correct response (daily); only 41% answered Item 4 correctly compared with 68% of people from the high acculturation group. Wide gaps in knowledge were also observed between high and low acculturated respondents for Items 6, 8, and 10 (see Table 3).

Discussion and Conclusion

Discussion

The SKILLD was developed to measure essential knowledge about diabetes among African Americans in the southeast United States with low health literacy. After translation to Spanish and modification of the answer key to capture colloquial speech, we administered the SKILLD to Mexican Americans with T2DM.

The SKILLD performed adequately in this sample (See Table 4). Cronbach’s alpha is lower than desired and lower than that obtained by Rothman et al. (2005) with African American patients. Alpha levels are generally lower when scales have few items that are scored dichotomously and have small sample sizes (Streiner & Norman, 2008). Three item-to-total correlations were lower than the 0.2 level recommended as demonstration of item cohesion (Streiner & Norman, 2008). Several interitem correlations were also low, meaning that scores on some items were not related to scores on most of the other items, which would contribute to a low Cronbach’s alpha and might indicate the items were not representative of the conceptual domain of diabetes knowledge. However, the five content experts rated each item as relevant and representative of essential diabetes knowledge. Although low interitem and item-to-total correlations on the SKILLD suggest that knowledge of one aspect of diabetes care was not related to knowledge about other aspects, for dichotomously scored

items such as these (correct or incorrect), limited variability among scores tends to lower correlation coefficients.

The interrater reliability among the scorers was robust, an indication of the SKILLD's stability. However, even using the modified answer key, scoring the SKILLD responses proved difficult for two reasons. First, some items include prompts that asked respondents to draw on their personal experiences rather than on their knowledge of general diabetes principles. For example, Item 2 asked for symptoms of low blood sugar but the item's probe asked participants what symptoms they felt when their blood sugar was low. Several participants reported that they had not experienced low blood sugar themselves and thus responded that there were no symptoms of low blood sugar. In such cases scorers were required to mark items as incorrect because the respondents did not list any of the symptoms required by the answer key. Although the participants' accounts of their own experiences, given in response to the probing question, may have accurately reflected the participants' experiences, the items could not be scored as correct. Second, the scorers were not always able to match the participants' colloquial phrases to the answer key.

Two SKILLD items (7 and 8) tested numeracy, or the ability to understand and use numbers. Only 12% of all participants gave correct responses for Item 7, which asked for normal blood glucose values. More participants gave correct responses for Item 8, which asked about normal A1C levels; however, far fewer respondents of low-acculturation responded correctly than those of high-acculturation (15% vs. 50%, respectively). The lack of diabetes knowledge captured by the SKILLD may be the result of low numeracy literacy as well as low health literacy.

The SKILLD is a valid measure of knowledge needed for diabetes self-management as demonstrated by the content validity index, the construct validity correlations, and the repeated-measures analysis. The content experts rated the SKILLD as having appropriate content and offered only minor suggestions for item rewording. The SKILLD demonstrated a significant increase in diabetes knowledge among participants who were assigned to receive a diabetes educational intervention. As expected, SKILLD scores were moderately negatively correlated with A1C levels and positively correlated with participants' years of education and acculturation level.

Participants who were less acculturated scored significantly lower on the SKILLD. Participants who were more acculturated responded correctly to more items than participants with low acculturation. This pattern was anticipated given the findings by Garcia (2008) that showed a positive association between diabetes knowledge and acculturation. However, it is preferable that a questionnaire designed for low literacy users and translated into Spanish would perform equally well among low- and high-acculturated groups. It is possible that the Spanish translation may have altered the meaning of the SKILLD items or that the SKILLD was administered inconsistently. However, it is probable that differences in scores reflect actual knowledge differences between low- and high-acculturated respondents. That is, people of low acculturation may have less knowledge of diabetes self-management concepts due to lower education (Kohler & Lazarin, 2008), low insurance coverage leading to fewer visits to doctors (Livingston, Minushkin, & Cohn, 2008), and language barriers common

among low acculturated Hispanics (Agency for Healthcare Research and Quality, 2001; Kohler & Lazarin, 2008).

Conclusion and Implications for Research and Practice

The findings from this study inform future revisions to the SKILLD. For instance, SKILLD items should be reworded so that there is only one question asked per item and probing questions should be modified so they do not ask about respondents' personal experiences. The answer key should be revised again so that acceptable responses include even more colloquial phrases and additional symptoms and complications, as appropriate. These changes will facilitate both administration of the SKILLD and scoring. Further testing with larger and different samples is warranted to evaluate modifications of the SKILLD.

The SKILLD uses an interview format, which may be more conducive to Mexican Americans' preferred ways of providing information than written surveys. However, oral administration of questionnaires requires trained personnel to administer the interview and score responses in research and clinical settings.

The SKILLD is a reliable, valid, and easy to administer tool. Nurses, other patient care providers, and health educators should use the SKILLD to establish baseline diabetes knowledge, as a launching point to focus on patient educational needs, to modify future teaching for individual needs, to facilitate rapport, and to assess patients' progress periodically.

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Table 1

SKILLD Items in English and Translated into Spanish, With Revised Answer Key.

Item no.	SKILLD items in English	Escala De Conocimiento Oral En Pacientes Diabéticos Con Bajo Nivel de Lectoescritura	Correct responses (<i>Revisions</i>)
1	What are the signs and symptoms of high blood sugar? (Name at least 2) <i>Probe:</i> How do you feel when your blood sugar is high or when you were diagnosed?	<i>¿Cuáles son los signos y síntomas del azúcar alto en la sangre? (al menos dos)</i> <i>Exploración: ¿Cómo se siente cuando tiene alto su nivel de azúcar o cuando le diagnosticaron que lo tiene alto?</i>	Answer must contain 2 of any of the following: extreme thirst, frequent urination, drinking or eating, blurred vision, drowsiness, fatigue.
2	What are the signs and symptoms of low blood sugar? (Name at least 2) <i>Probe:</i> How do you feel when your blood sugar is too low?	<i>¿Cuáles son los signos o síntomas del azúcar bajo en la sangre? (al menos dos)</i> <i>Exploración: ¿Cómo se siente cuando tiene muy bajo su nivel de azúcar?</i>	Answer must contain 2 of any of the following: hunger, nervousness, jitteriness, mood swings, irritability, confusion, sweatiness, fast heart rate <i>dizziness, lightheadedness, weakness</i>
3	How do you treat low blood sugar? <i>Probe:</i> What should you do if your sugar is too low? How can you bring your blood sugar up if it's too low?	<i>¿Cómo trata el nivel bajo de azúcar?</i> <i>Exploración: ¿Qué debería hacer si tiene bajo su nivel de azúcar? ¿Cómo puede usted subir su nivel de azúcar si está muy bajo?</i>	Answer must be clear about action: drink juice, eat candy, drink milk, <i>eat sugar or sweets, drink sugared soft drink</i> , or at least 15 grams of carbohydrates
4	How often should a person with diabetes check his or her feet? <i>Probe:</i> Once a day, once a week, or once a month?	<i>¿Qué tan seguido (con qué frecuencia) una persona con diabetes debe revisarse sus pies?</i> <i>Exploración: ¿Una vez al día, una vez a la semana o una vez al mes?</i>	Answer cannot vary: daily
5	Why are foot exams important in someone with diabetes? <i>Probe:</i> Why is it important to look at your feet? What are you looking for?	<i>¿Por qué son importantes los exámenes de los pies en las personas con diabetes?</i> <i>Exploración: ¿Por qué es importante que se revise los pies? ¿Qué busca cuando se los revisa?</i>	Answer must be clear about action. The following are examples. Answers may vary but must be clear about consequences. <i>Feet get damaged, check for sores, check for wounds, feeling/sensation changes or gets worse</i>
6	How often should you see an eye doctor and why is it important? <i>Probe:</i> How often? Why?	<i>¿Qué tan seguido (con qué frecuencia) debería consultar a un oftalmólogo (oculista) y por qué es importante?</i> <i>Exploración: ¿Qué tan seguido (con qué frecuencia)? ¿Por qué?</i>	Answer must contain a two-part answer: Visits are yearly. Reasons can include <i>check for eye damage, diabetes causes eye problems, blindness can occur, eyes can get damaged, glaucoma, or check for changes in eyes</i>
7	What is a normal fasting blood glucose or blood sugar? <i>Probe:</i> When you get up first thing in the morning and check your blood sugar before you eat or take medicine, what should it be? What 2 numbers?	<i>¿Cuál es un nivel normal de glucosa o de azúcar en la sangre en ayunas?</i> <i>Exploración: ¿Cuando se levanta temprano en la mañana y revisa su nivel de azúcar antes de comer o tomar alguna medicina, qué nivel de azúcar debería tener? ¿Cuáles son los 2 números (nivel más alto y más bajo) que debería tener?</i>	Both numbers [range] must be included: 70 or 80 to 120
8	What is a normal HbA1c (hemoglobin A1C) or "average blood sugar test"? <i>Probe:</i> When they draw blood from your arm and get an average blood sugar reading, what should it be?	<i>¿Cuál es un nivel normal de HbA1c (hemoglobina A1C) o "prueba promedio de azúcar en la sangre"?</i> <i>Exploración: ¿Cuando le sacan sangre de su brazo y obtienen una lectura promedio de azúcar en la sangre, cuál debería ser la lectura promedio?</i>	Any number <7

Item no.	SKILLD items in English	Escala De Conocimiento Oral En Pacientes Diabéticos Con Bajo Nivel de Lectoescritura	Correct responses (<i>Revisions</i>)
9	How many times per week should someone with diabetes exercise and for how long? <i>Probe:</i> How many times per week should someone with diabetes exercise and for how long?	<i>¿Cuántas veces a la semana debería hacer ejercicio alguien con diabetes y por cuánto tiempo?</i> <i>Exploración: ¿Cuántas veces a la semana? ¿Cuánto tiempo por día?</i>	Answer must contain a two-part answer. Numbers reported must fall within range: 3 to 5 times per week and 30 to 45 minutes
10	What are some long-term complications of uncontrolled diabetes? (name at least 2) <i>Probe:</i> Do you know anyone that has diabetes and had “bad things” happen to them? What are some of those “bad things”?	<i>¿Cuáles son algunas de las complicaciones a largo plazo de la diabetes sin control?</i> <i>Exploración: ¿Sabe usted de alguien que tenga diabetes y que le haya sucedido “cosas malas”? ¿Cuáles son algunas de esas “cosas malas”?</i>	Answers must contain any 2 of the following. Answer must state consequences: blindness, impaired vision, kidney damage, dialysis, amputation, <i>wounds, infections</i> , neuropathy, impotence, <i>stomach problems, heart problems, foot problems</i> , or <i>high blood pressure</i>

Note. SKILLD = Spoken Knowledge in Low Literacy in Diabetes.

Table 2Characteristics of Sample ($N = 72$).

Characteristics	Mean $\pm$ SD or frequency (percentage)
Female	48 (66.7)
Age in years	49.6 $\pm$ 9.1
Education in years	12.3 $\pm$ 4.3
Acculturation (low = 0–12, high = 13–20)	11.51 $\pm$ 6.14
Diabetes knowledge (SKILLD score)	5.20 $\pm$ 2.18
A1C	8.5 $\pm$ 2.32

Note. SKILLD = Spoken Knowledge in Low Literacy in Diabetes.

Table 3

Association of Correct SKILLD Items With Acculturation Level.

Item	Low acculturation correct (<i>n</i> = 34)	High acculturation correct (<i>n</i> = 34)	Total (<i>N</i> = 68)
1	26%	53%	40% *
2	24%	56%	40% *
3	79%	94%	87%
4	41%	68%	54% *
5	71%	88%	79%
6	47%	79%	63% *
7	12%	12%	12%
8	15%	50%	32% *
9	29%	44%	37%
10	59%	82%	71% *
Total score, mean (<i>SD</i>)	4.06 (1.8)	6.26 (2.0)	5 (2.0) **

Note. SKILLD = Spoken Knowledge in Low Literacy in Diabetes.

* χ^2 $p < .05$.

** t test $p < .001$.

Table 4

Summary of Evidence of SKILLD's Reliability and Validity.

Psychometric property	Evidence
Internal consistency	Cronbach's $\alpha = .64$ Interitem correlations = 0.004–0.536 Item-to-total correlations = 0.051–0.481
Interrater reliability	Intraclass correlation coefficient (ICC) for items = 0.54–1.00 ICC for total score = 0.86
Content validity	Content validity index = 1.0
Construct validity	SKILLD scores negatively weakly correlated with A1C ($r = -.278, p = .029$) SKILLD scores positively moderately correlated with years of education ($r = .470, p < .001$) SKILLD scores positively moderately correlated with acculturation ($r = .515, p < .001$) Significant associations found between high acculturation level and correct responses on 7 of the 10 SKILLD items SKILLD scores for people of low acculturation significantly lower than for people of high acculturation (4.06 vs. 6.29, $t = 4.885, df = 66, p < .001$) SKILLD scores increased significantly for participants who received a diabetes self-management educational program (time by group interaction, $F(df = 1, 47) = 4.633, p = .037$) SKILLD solicited useful information about patients' diabetes knowledge

Note. SKILLD = Spoken Knowledge in Low Literacy in Diabetes.