Impact of Diabetes Self-Management Education on Psychological Distress and Health Outcomes Among African Americans and Hispanics/Latinos With Diabetes

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ABSTRACT

Purpose. Diabetes self-management education and support (DSME/S) is an effective strategy to improve health outcomes. However, little is known about the impact of formal DSME/S on psychological distress among minority populations. The study purposes were to 1) explore the impact of a culturally tailored DSME/S intervention on psychological distress and diabetes-related outcomes among African-American and Hispanic/Latino participants and 2) examine differences across groups in self-care, self-efficacy, diabetes knowledge, and psychological distress.

Methods. Using a pre- and post-test research design, baseline and post-test assessments were conducted at weeks 1 and 7 of the intervention, respectively. Statistical analyses included descriptive statistics for demographic variables and four outcomes (self-care, self-efficacy, knowledge, and psychological distress score), general linear regression analysis of the post-test outcomes, and the Spearman correlation between psychological distress score and the outcomes.

Results. Compared to African-American participants (n = 122), Hispanic/Latino participants (n = 137) were significantly younger and less educated. The two groups were comparable in sex, income, and health status. Significant pre- to post-test improvements were seen in each group for self-care, self-efficacy, and psychological distress. Diabetes knowledge had moderate improvement. Hispanics/Latinos had significantly greater post-test self-efficacy and self-care scores compared to African Americans. For both African-American and Hispanic/Latino participants, lower psychological distress scores were generally associated with greater self-efficacy and self-care. Psychological distress scores were not significantly associated with knowledge in African-American or Hispanic/Latino participants. For African Americans only, better health status was significantly associated with less psychological distress.

Conclusion. DSME/S programs have the potential to improve psychological health among African Americans and Hispanics/Latinos, which can lead to better diabetes outcomes.

Psychosocial problems have come to the forefront as a crucial concern affecting people with diabetes (PWD) across racial and ethnic groups. The daily, rigorous demands of a diabetes self-care regimen take an emotional toll on PWD. It is well documented that PWD are more likely to experience clinical depression, distress, and depressive symptoms than people without diabetes (1–4). Studies have further shown linkages to higher health care costs, more days of missed work, and mortality (5–9). The chronic stress associated with diabetes has been termed diabetes-related distress (DD). This condition has been defined to include diabetes regimen distress, emotional distress, physician-related distress, and inter-

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personal stress (10). In a meta-analysis of 55 studies \((n = 36,998)\), DD was found to be a common problem for people with type 2 diabetes (11). Studies have shown that DD is associated with poor glycemic control, low levels of physical activity, and diet and medication nonadherence (3,12,13).

The American Diabetes Association’s psychosocial care guidelines recommend that PWD should be evaluated and receive training until they attain competence in diabetes self-care and the use of diabetes technologies (14). The Diabetes Distress Scale and the Problem Areas in Diabetes Scale are two routinely administered patient-appropriate validated measures to assess and monitor adult PWD (14). As part of assessing the psychosocial well-being of PWD, providers should consider their burden of treatment and levels of confidence and self-efficacy for self-care behaviors (14). A number of studies have shown that increasing the diabetes-related self-efficacy of PWD can help lower the psychosocial burden of their illness (15–18).

DSME/S is a proven strategy to affect psychosocial outcomes. Research has shown that DSME interventions improve glycemic control through their success in reducing DD (13,19). Developing healthy coping skills to address psychosocial issues is recommended as one of eight core content areas for DSME/S curriculum (20). Addressing the needs of diverse PWD in a culturally meaningful manner is another crucial consideration, particularly in African-American and Hispanic/Latino communities, where health disparities in the onset and progression of diabetes are well documented (21–25). A potential contributor to these disparities is the psychosocial burden of living with diabetes, which is greater for African Americans and Hispanics/Latinos compared to non-Hispanic whites (26). Furthermore, self-assessment reports indicate that African Americans perceive greater diabetes severity and Hispanics/Latinos report lower perceived health status (26).

A generic approach may not be suitable for diverse racial and ethnic groups who have lived unique experiences. Specifically, cultural influences can affect an individual’s experience with diabetes, and the cultural inappropriateness of diabetes treatment regimens is likely to pose a potential barrier to health (27). There is robust research reporting that DSME/S interventions tailored for African Americans and Hispanics/Latinos have the potential to improve their diabetes health outcomes—including emotional health (28–30). Sí, Yo Puedo Controlar Mi Diabetes (Sí, Yo Puedo) and Wisdom, Power, Control are community-based DSME/S interventions designed for Hispanics/Latinos and African Americans, respectively (29,30). Increasing self-efficacy, enhancing diabetes self-care, and reducing psychological distress are the three primary outcomes of the two programs. Improving participants’ self-care competency and emotional well-being are the foci of these interventions. The Texas A&M AgriLife Extension Service (AgriLife Extension) developed these interventions using a community-based participatory approach to expand its reach to underserved minority communities.

There are limited studies documenting the association of culturally appropriate DSME/S and emotional well-being in minority and ethnic populations. Sí, Yo Puedo and Wisdom, Power, Control have previously reported findings specific to their four primary behavioral and clinical metrics: self-efficacy, diabetes self-care, diabetes-related knowledge, and A1C (29,30). However, psychological distress, a secondary outcome measure, has not been explored. This study builds on this earlier work. The purposes of this study were to (1) explore the impact of a culturally tailored DSME/S intervention on psychological distress and diabetes-related outcomes among African-American and Hispanic/Latino participants and (2) examine differences across population groups in psychological distress and diabetes knowledge, self-efficacy, and self-care.

**Research Design and Methods**

A pre- and post-test research design was employed for this study. The baseline and post-test assessments were conducted at weeks 1 and 7 of the intervention, respectively. Researchers obtained approval from the Texas A&M University institutional review board (IRB2015-0562D).

**Sample and Settings**

Inclusion criteria were as follows: self-identified African Americans or Hispanics/Latinos diagnosed with type 2 diabetes, who were ≥18 years of age and willing to participate in the study and complete a consent form. Pregnant women diagnosed with gestational diabetes were excluded.

The DSME/S interventions were promoted through a variety of media outlets (e.g., flyers, newspaper press releases, radio public service announcements, and social media). These communication channels were the primary recruitment method for the two programs. Participants enrolled by calling the AgriLife Extension county office to pre-register. Those who did not pre-register were permitted to enroll on the first day of class. Only participants consenting to participate in the study and completing pre- and post-test surveys were included in the statistical analyses.

The programs were part of AgriLife Extension’s statewide educational outreach efforts, which are largely delivered by county agents and community partners. Classes were offered in rural and urban counties in Texas. Classes for each program were conducted in a variety of settings such as community centers, churches, health clinics, senior centers, and local AgriLife Extension county offices. Sites were selected through grassroots efforts such as community partners hosting a class, local health coalitions...
identifying areas of need, and clinics adopting the programs. For this study, 19 Sí, Yo Puedo and 15 Wisdom, Power, Control classes were conducted. Enrollment in Sí, Yo Puedo was 240 participants and in Wisdom, Power, Control was 160 at the start of the study. All participants completed the consent form and had a baseline assessment.

**Intervention**

Sí, Yo Puedo and Wisdom, Power, Control are 7-week community-based DSME/S programs delivered by trained class facilitators (29–31). Week 1 is an orientation session, followed by six weekly educational lessons. The pre-test assessment is conducted during orientation.

During the study, class leaders for the two programs were typically health professional volunteers who partnered with county agents to implement classes. Class leaders were primarily individuals who were representative of the targeted population. Training for class leaders was a half-day workshop on curriculum implementation.

The programs were culturally tailored for their respective populations in terms of dietary food preferences, language, and cultural norms and beliefs. Each session was ~2 hours in length, and session topics included diabetes myths and facts, blood glucose testing, healthy eating with diabetes (e.g., portion sizes, meal planning, and food label reading), physical activity and diabetes, medication compliance, healthy coping, and preventing diabetes complications.

Participants who completed the course attended five to seven sessions and completed the week 7 post-test. Table 1 describes the intervention format, lesson topics, and instructional strategies. Additional details about the intervention have been previously published (29–30).

Cultural tailoring for Sí, Yo Puedo included implementing classes in Spanish and catering to bilingual participants, using weekly educational video novellas (i.e., Spanish soap operas that are popular in this population), which modeled self-management behaviors in the context of culturally relevant situations. Wisdom, Power, Control was tailored for African Americans in a similar manner to Sí, Yo Puedo (32). The adaptation of this intervention was informed by a community needs assessment, which found that family and church were key cultural values (31).

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**TABLE 1. Sí, Yo Puedo and Wisdom, Power, Control Intervention Overview**

<table>
<thead>
<tr>
<th>Class Format</th>
<th>Weekly Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Seven weekly sessions of 1.5–2 hours in length</td>
<td>Week 1: Orientation: introduction to diabetes self-care</td>
</tr>
<tr>
<td>• Review of weekly homework activity</td>
<td>Week 2: Understanding diabetes</td>
</tr>
<tr>
<td>• Guided discussion on the video novella (i.e., soap opera) messages</td>
<td>Week 3: Blood glucose testing</td>
</tr>
<tr>
<td>• Short lecture on weekly topic</td>
<td>Week 4: Healthy eating: portion sizes, meal planning, and food labeling</td>
</tr>
<tr>
<td>• Experiential activities reinforcing dietary principles and self-care practices</td>
<td>Week 5: Physical activity and diabetes</td>
</tr>
<tr>
<td>• Weekly power phrase recited throughout class to reinforce the empowerment message (e.g., “Yo puedo controlar mi diabetes!” (I can control my diabetes)</td>
<td>Week 6: Medicines and diabetes</td>
</tr>
<tr>
<td>• Instructional Strategies</td>
<td>Week 7: Preventing diabetes complications</td>
</tr>
</tbody>
</table>

- Video novella with guided discussions
- Blood glucose monitoring instruction
- Use of seven diabetes self-care steps to reinforce disease management: 1) eat healthy; 2) test blood glucose levels; 3) talk to your doctor; 4) move more; 5) check your eyes, teeth, and feet; 6) take your medicines; and 7) manage stress
- Weekly power phrase recited throughout class to reinforce the empowerment message (e.g., “Yo puedo controlar mi diabetes!” (I can control my diabetes)
- Short presentations exploring self-care practice
- Problem-solving (group and individual)
- Goal-setting
- Action plan as a take-home activity to practice lessons learned in class
- Feedback opportunities (e.g., review of weekly homework and reinforcement of positive behaviors and attitudes)
- Visual aids (e.g., food photo cards, pictorial handouts, and pictorial homework sheets)
- Meal planning with healthy plate concept
- Food label reading
Measures and Variables

Demographics
At baseline, a battery of 19 demographic items assessed participant characteristics, which included age, sex, race/ethnicity, education, income, and health insurance coverage. Baseline and post-test health status was assessed with the following question: “What would you say your health is most of the time?” A five-point rating scale was used, ranging from 1 = poor to 5 = excellent. Post-test evaluations consisted of 21 items for assessing program satisfaction.

Psychological Distress
The Kessler-6 questionnaire was used to assess psychological distress (33). Six items asked participants to self-report how often they felt nervous, hopeless, restless, depressed, worthless, or that everything was an effort. Participants reported their feelings of distress during the past 30 days on a five-point Likert scale ranging from 0 = none of the time to 4 = all of the time. Responses were summed to create a composite score that ranged from 0 to 24, with higher scores indicating greater psychological distress.

Diabetes Knowledge
A 10-item knowledge questionnaire based on the Spoken Knowledge in Low Literacy in Diabetes Scale and adapted in a manner appropriate for minority populations was used (34). The knowledge survey responses were totaled to generate an overall score.

Diabetes Self-Efficacy
An eight-item tool based on the Diabetes Self-Efficacy Scale was used (35). The response scales were modified from the original instrument to simplify its administration, particularly for seniors and individuals with low literacy. The response options were modified from a 1–10 rating system to a four-point Likert scale ranging from 1 = I don’t feel sure to 4 = I feel very sure. A higher mean self-efficacy score suggested higher confidence in controlling diabetes. An earlier study reported this scale to have a high internal consistency, with a Cronbach’s alpha of 0.93 at baseline (31). An overall score was generated by calculating the means of answered items. Participants were assigned a missing value with more than half the items missing. The modified self-efficacy scale measured participants’ confidence to engage in self-management behaviors such as eating meals every 4–5 hours, exercising for 15–30 minutes four to five times per week, following their diet when they have to prepare or share food with other people who do not have diabetes, and knowing what to do when their blood glucose level goes higher or lower than it should be.

Diabetes Self-Care
The 13-item Summary of Diabetes Self-Care Activities (SDSCA) was used (36), but as with the self-efficacy instrument, the response choices were modified. In the original SDSCA instrument, participants report the number of days they engaged in a health behavior in the past week. The modified format rates self-management behaviors on a four-point Likert scale ranging from 1 = none of the days to 4 = all of the days. A higher mean self-care score indicates engagement in more positive diabetes self-care practices. A previous study showed this scale to have a high internal consistency, with a Cronbach’s alpha of 0.88 at baseline (36). The self-care scale was scored by summing the mean of the answered items. The SDSCA measures general diet, specific diet, exercise, blood glucose testing, foot care, and smoking.

Covariates
Participants’ background characteristics were included in the analyses as covariates. These variables included ethnicity (i.e., African American or Hispanic/Latino), age, sex, income, education, and health status.

Statistical Analysis
Descriptive statistics, including median and interquartile range (IQR) for continuous variables and frequency and percentage for categorical variables, were reported for outcome variables (i.e., psychological distress, diabetes knowledge, self-efficacy, and diabetes self-care) and covariates. The Pearson χ² test for categorical variables and the Wilcoxon rank-sum test for continuous variables were used to compare the characteristics of African American and Hispanic/Latino participants. In the linear regression of post-test scores, unadjusted analysis was conducted with only pre-test status and adjusted analysis with pre-test status and covariates. Regression analysis was performed separately for subgroups of African Americans and Hispanics/Latinos, as well as combined for all participants. The Spearman correlation coefficient was calculated for correlations between psychological distress and the other three outcome variables. The pre-test psychological distress score was also included in the adjusted analysis of diabetes knowledge, self-efficacy, and self-care to test its association with these outcome variables. The backward elimination procedure, with a P value threshold of 0.05, was used to select significant variables in adjusted analyses.

Results
Descriptive statistics of demographic variables and outcome variables, correlation coefficients by ethnic group, and multivariable regression analysis results of the entire study sample are presented in Tables 2–5, respectively. Supplementary Tables S1–S4 show results from subgroup regression analysis by ethnic group.

Demographics
Table 2 summarizes the baseline characteristics of the 259 participants completing Sí, Yo Puedo (n = 137) and Wisdom, Power, Control (n = 122). The median age was 55 years for Hispanics/Latinos and 66 years for African Americans. Hispanics/Latinos had a greater proportion of participants with less than a high school education (43%, n = 55), compared to African Americans (10%, n = 12).
Income levels were low (<20,000) for both groups: 50% for Hispanics/Latinos (n = 51) and 57% for African Americans (n = 58). Nearly half of the African-American participants reported their health status to be “good” (49%, n = 59), and 33% (n = 39) indicated their health to be “fair.” Approximately 41% (n = 49) of Hispanic/Latino participants reported their health status to be “good,” and 45% (n = 53) rated their health to be “fair.”

The number of participants attending the six educational sessions from week 2 to week 7 were 222, 229, 222, 220, 217, and 221, respectively. Among Sí, Yo Puedo participants (n = 122), 73.7% attended at least five classes that included completing the week 7 post-test; the rate for Wisdom, Power, Control participants (n = 137) was 75.5%. Combined attendance rates for both programs (n = 259) was 76.6%.

Descriptive Statistics of Diabetes Outcomes
Table 3 presents the descriptive statistics of diabetes-related outcomes from the pre- and post-test, as well as the difference between the two (i.e., post-test value minus pre-test value). For the combined sample of African Americans and Hispanics/Latinos, significant pre- to post-test improvements were reported for self-care (median increase 6.1, IQR 2.0–11.0), self-efficacy (median increase 0.5, IQR 0.3–1.1), and psychological distress (median –0.2, IQR –0.7 to 0.0; negative sign indicates reduction), whereas knowledge had moderate improvement (median increase 1.0, IQR 0.0–3.0). Hispanics/Latinos reported the greatest reduction in psychological distress scores (median difference –0.3, IQR –0.8 to 0.0), significantly different (P < 0.001) from African Americans, who reported no change (median difference 0.0, IQR –0.5 to 0.1). For both groups, there were minimal improvements in diabetes knowledge scores, which were comparable to the combined sample. Hispanics/Latinos’ self-care scores greatly improved from pre- to post-test (median difference 7.0, IQR 3.0–13.0), and this improvement was significantly higher (P < 0.001) than African Americans' (median difference 4.0, IQR 1.0–9.0).

Improvement from pre- to post-test in self-efficacy for Hispanics/Latinos (median difference 0.7, IQR 0.3–1.3) was significantly higher (P = 0.01) than in African Americans (median difference 0.4, IQR 0.1–1.0).

Association Between Distress and Other Health Outcome Variables
The relationship between psychological distress and health outcomes was explored using the Spearman correlation coefficients shown in Table 4. The pre- and post-test self-efficacy
and self-care scores were negatively correlated with distress such that high stress was associated with low self-efficacy and low self-care. Such a negative correlation was not observed for knowledge. Compared to Hispanics/Latinos, the associations between psychological distress scores and self-efficacy and self-care scores were generally stronger for African Americans.

The psychological distress score was also included in the adjusted regression analysis for diabetes knowledge, self-efficacy, and self-care. Significant interaction effects were found for pre-test psychological distress with self-care in African Americans (Supplementary Table S2), indicating that distress was associated with self-care and self-efficacy at both pre- and post-tests. Regression Analysis of Four Outcomes: Self-Care, Self-Efficacy, Knowledge, and Distress

On average, Hispanic/Latino participants had significantly higher self-care scores than African Americans, with medians of 32.0 versus 29.0 ($P = 0.01$) shown in Table 3. After adjusting the pre-test self-care score, Hispanics/Latinos had higher self-care scores by 2.44 compared to African Americans (Table 5). None of the demographic covariates were significantly associated with the post-test self-care score for either ethnic group, as shown in Tables 5 and S1.

On average, Hispanic/Latino participants had a significantly higher level of self-efficacy than African Americans, with median scores of 3.8 and 3.5, respectively ($P <0.001$), as shown in Table 3. After adjusting for pre-test self-efficacy, this difference remained significant ($P = 0.011$), as shown in Table 4. As seen in Supplementary Table S2, age was a significant factor for African Americans, such that older participants had lower post-test self-efficacy. For Hispanics/Latinos, income level showed significance; the self-efficacy scores of participants with an annual income level...

### TABLE 3. Descriptive Statistics of Diabetes Outcomes for Pre-Test, Post-Test, and Difference Between the Two Time Points (i.e., Post-Test Outcome Minus Pre-Test Outcome)

<table>
<thead>
<tr>
<th></th>
<th>African Americans (n = 122)</th>
<th>Hispanics/Latinos (n = 137)</th>
<th>Full Sample (n = 259)</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test self-care</td>
<td>24.4 (6.2); 25.0 (20.0–28.0)</td>
<td>23.7 (7.2); 24.0 (18.5–29.0)</td>
<td>23.8 (7.0); 24.5 (19.0–28.0)</td>
<td>0.390</td>
</tr>
<tr>
<td>Post-test self-care</td>
<td>28.9 (6.3); 29.0 (25.0–33.0)</td>
<td>31.0 (7.0); 32.0 (26.0–36.0)</td>
<td>30.0 (6.7); 31.0 (26.0–35.0)</td>
<td>0.010</td>
</tr>
<tr>
<td>Difference self-care</td>
<td>4.5 (7.0); 4.0 (1.0–9.0)</td>
<td>7.4 (7.7); 7.0 (3.0–13.0)</td>
<td>6.2 (7.6); 6.0 (2.0–11.0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Pre-test self-efficacy</td>
<td>2.8 (0.7); 2.9 (2.4–3.3)</td>
<td>2.8 (0.7); 2.8 (2.3–3.4)</td>
<td>2.8 (0.7); 2.9 (2.4–3.4)</td>
<td>0.700</td>
</tr>
<tr>
<td>Post-test self-efficacy</td>
<td>3.3 (0.6); 3.5 (3.0–3.8)</td>
<td>3.5 (0.6); 3.8 (3.3–3.9)</td>
<td>3.4 (0.6); 3.6 (3.1–3.9)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Difference self-efficacy</td>
<td>0.5 (0.7); 0.4 (0.1–1.0)</td>
<td>0.7 (0.8); 0.7 (0.3–1.3)</td>
<td>0.6 (0.8); 0.5 (0.3–1.1)</td>
<td>0.010</td>
</tr>
<tr>
<td>Pre-test knowledge</td>
<td>7.2 (1.9); 8.0 (6.0–9.0)</td>
<td>7.1 (2.2); 7.0 (5.0–9.0)</td>
<td>7.1 (2.1); 8.0 (6.0–9.0)</td>
<td>0.810</td>
</tr>
<tr>
<td>Post-test knowledge</td>
<td>8.4 (1.5); 9.0 (8.0–9.0)</td>
<td>8.8 (1.5); 9.0 (8.0–10.0)</td>
<td>8.5 (1.5); 9.0 (8.0–10.0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Difference knowledge</td>
<td>1.1 (2.0); 1.0 (0.0–2.0)</td>
<td>1.7 (2.2); 1.0 (0.0–3.0)</td>
<td>1.4 (2.2); 1.0 (0.0–3.0)</td>
<td>0.020</td>
</tr>
<tr>
<td>Pre-test psychological distress</td>
<td>1.6 (0.7); 1.3 (1.0–1.8)</td>
<td>1.9 (0.7); 1.8 (1.2–2.5)</td>
<td>1.8 (0.7); 1.7 (1.0–2.2)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Post-test psychological distress</td>
<td>1.5 (0.6); 1.3 (1.0–1.8)</td>
<td>1.5 (0.6); 1.3 (1.0–1.8)</td>
<td>1.5 (0.6); 1.3 (1.0–1.8)</td>
<td>0.470</td>
</tr>
<tr>
<td>Difference psychological distress</td>
<td>−0.1 (0.6); 0.0 (–0.5 to 0.1)</td>
<td>−0.4 (0.7); 0.0 (–0.8 to 0.0)</td>
<td>−0.3 (0.7); 0.0 (–0.7 to 0.0)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Data are reported as mean (SD); median (IQR).
income >$50,000 were, on average, lower than those with an annual income <$20,000 by 0.61 (P = 0.008), and lower than those with an annual income between $20,000 and $50,000 by 0.62 (P = 0.006).

Compared to African Americans, Hispanics/Latinos had significantly higher post-test diabetes knowledge (average 8.8 vs. 8.4, P <0.001), whereas the pre-test knowledge scores between the two groups were not significantly different, as shown in Table 3. None of the covariates were significant in the adjusted analysis of African Americans (Supplementary Table S3), but age and sex were significantly associated with post-test diabetes knowledge only for Hispanics/Latinos such that age, as a continuous variable, was negatively associated with diabetes knowledge (i.e., older participants on average had lower post-test knowledge), and females had higher diabetes knowledge than males by an average of 1.15. The effect of age remained significant in the analysis of the complete sample shown in Table 5.

The post-test psychological distress score was positively correlated with the pre-test score for both African Americans and Hispanics/Latinos (Supplementary Table S4 and Table 5). Health status was significantly associated with post-test scores only for African Americans, as shown in Supplementary Table S4, such that participants with “good” to “very good” health status had less post-test psychological distress than those with “fair” health status. After combining the African-American and Hispanics/Latinos’ samples in Table 5, the health status association remained significant.

**Discussion**

The findings of this study highlight the improvement in psychological distress and diabetes-related health outcomes among African Americans and Hispanics/Latinos who participated in a culturally appropriate DSME/S intervention. Consistent with other...
literature, improving mental health outcomes is a potential benefit of culturally appropriate, community-based interventions targeting African Americans and Hispanics/Latinos (37).

A notable observation in this study was that high psychological distress was found to reflect low self-efficacy and low self-care. Although the association was stronger for African Americans, this finding suggests the salient impact of DSME/S on emotional health. Zulman et al. (38) assert that the aim of diabetes self-management interventions should be to address and reduce some of the feelings of anxiety, worry, guilt, and the fear that accompany this condition. Among African Americans, post-test psychological distress scores were significantly associated with post-test perceived health status. Specifically, this study demonstrated that African Americans who perceived their health status to be “good” to “very good” at post-test had lower post-test psychological distress. Perceptions about diabetes and experiences with the illness have been previously shown to influence emotional health in African Americans (27). One study found that African Americans who reported their diabetes to be serious also reported increased emotional distress (27).

For African Americans and Hispanics/Latinos, there was minimal improvement in diabetes knowledge scores, and the association between diabetes knowledge and psychological distress was nonsignificant. The fact that ethnicity was not significant in pre- and post-test regression analysis could be due to the nonsignificant improvement in knowledge scores. Evidence about the effect of diabetes knowledge on disease-related outcomes has been inconclusive. For example, after systematically reviewing 72 studies, Norris et al. (39) found an absence of a consistent, positive relationship between diabetes knowledge and glycemic control, concluding that psychosocial factors may account for this absence.

Our results suggest that self-efficacy improvements were significantly greater for Hispanics/Latinos than for African Americans. Despite these differences, African Americans’ self-efficacy scores increased modestly from pre- to post-test, demonstrating a positive impact. A study by Walker et al. (40) revealed that, for low-income, minority populations, high self-efficacy was associated with improved glycemic control, medication adherence, and mental health–related quality of life. The authors suggest that emphasis on self-efficacy is relevant for educational interventions developed for low-income, minority populations (40). Building on this research, other investigations have found high self-efficacy to be a significant factor related to reduced DD among racial and ethnic minority populations (10,18).

An intriguing finding was the association between self-efficacy and age, such that older African Americans reported significantly lower self-efficacy post-test scores. This finding is contrary to what would be anticipated, given that, overall, African Americans experienced improvements in self-efficacy. Further exploration of the relationship between age and self-efficacy would be worthwhile. Such research is especially warranted for older adults who are at an increased risk for developing diabetes.

When examining the interaction between income and self-efficacy, this study found that higher income (>50,000) corresponded to lower self-efficacy. This finding does not agree with an earlier investigation showing that a higher socioeconomic status had more positive outcome expectations and self-efficacy (41–43). Future research is needed to understand the importance of self-efficacy across all income levels.

Overall, this study suggests that DSME/S designed for African Americans and Hispanics/Latinos is successful in improving psychological distress, self-efficacy, and self-care behaviors (44). Although we did not assess clinical outcomes in this study, related research shows that similar changes in these constructs are related to meaningful changes in A1C values (11,29,30,38). Despite the differential effects of the programs for African Americans and Hispanics/Latinos on different study outcomes, there is evidence suggesting that culturally appropriate DSME/S offers opportunities for minority and ethnically diverse PWD to enhance their behavioral and mental health outcomes (45). This study provides an understanding of the crucial role psychosocial factors play in diabetes self-management, which should be a major focus in designing targeted DSME/S interventions.

**Limitations**

There are several limitations to this study. The small sample size may have provided inadequate statistical power to detect significant differences between the subgroups and significant associations in the regression analyses. This study sample of African Americans and Hispanics/Latinos in the southwest region of the United States may not be representative of populations in other areas of the country. The lack of statistical significance in pre- and post-test regression analyses could be due to the limited sample size and to correlation between the pre-test psychological scores and other pre-test outcomes. This study involved an immediate pre- and post-test design, so its findings do not address long-term improvements in outcome variables post-intervention. Finally, this study did not include a no-treatment control group; its pre- and post-test design was implemented due to its feasibility. Future research is planned with longer-term follow-up and consideration of a minimal-treatment control group.

**Implications**

The two culturally appropriate DSME/S programs discussed in this article, *Sí, Yo Puedo* and Wisdom,
Power, Control, illustrate the value of and need for advancing similar initiatives that are focused on psychosocial support. The promise of these culturally tailored interventions is their potential to reduce African-American and Hispanic/Latino diabetes disparities and ultimately improve long-term health outcomes in these racial/ethnic minority groups.

Although this study was implemented through the Cooperative Extension System, the DSME/S findings can be generalized to the work of certified diabetes educators (CDEs) and other health professionals who play a major role in helping minority PWD cope with the emotional struggles associated with diabetes self-management. Addressing DD as part of routine diabetes care may help to reveal unmet psychosocial needs and allow for reduction in DD (10,42). DSME/S provides opportunities to routinely assess diabetes-related stress, to pinpoint the nature of stressors, to assist PWD in establishing realistic self-care goals to build skills and confidence, and to link PWD to community resources to sustain lifestyle changes. All of these areas of support are essential to minimize the high levels of stress associated with diabetes self-management.

CDEs are distinctively trained and possess expertise that can substantially contribute to the creation of interventions and teaching of DSME/S targeting underserved, minority communities. Sensitivity to the culture of PWD culture opens the door to establishing a trusting relationship, which is paramount in delivering psychosocial care. Effective, culturally competent care goes beyond surface factors such as language and gives attention to deep structural issues encompassing cultural beliefs and practices. A crucial component for advancing the national agenda to promote health equity is to provide diabetes care that coincides with the cultural context of the individual. To this end, tailored DSME/S programs that are relevant and responsive to the needs of different racial and ethnic groups can make great strides toward this national vision.

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

Author Contributions
N.P.-P. is the lead researcher of the study, conducted the literature search, and wrote the manuscript. G.H. conducted the data analysis, contributed to the methods, and reviewed and edited the manuscript. M.L.S. and M.G.O. reviewed and edited the manuscript. R.P. served as mental health advisor in the development of the manuscript. N.P.-P. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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