

Article

Program Evaluation of Do Well, Be Well with Diabetes: Promoting Healthy Living in Adults with Type 2 Diabetes

Sumathi Venkatesh ^{1,*} , Katelin M. Alfaro Hudak ¹, Morium B. Bably ², Stephanie M. Rogus ¹ , Danielle Krueger ³, Heidi Fowler ¹ and Michael Laguros ¹

¹ Department of Nutrition, Texas A&M AgriLife, College Station, TX 77843, USA; stephanie.rogus@ag.tamu.edu

² Research Center, Texas A&M AgriLife Research, El Paso, TX 79927, USA

³ Department of Nutrition, Texas A&M University, College Station, TX 77843, USA

* Correspondence: sumathi.venkatesh@ag.tamu.edu

Abstract

Background/Objectives: Type 2 diabetes (T2D) is a pressing public health challenge in the United States (U.S.). Community-based diabetes education programs equip individuals with T2D with the knowledge and skills to improve dietary behaviors, build confidence, and better manage their condition to reduce complications. However, few studies evaluate self-care adherence and self-efficacy together. This study examined participant adherence to diabetes self-care practices and confidence in managing diabetes through a community-based education program. **Methods:** *Do Well, Be Well with Diabetes* (DWBWD) is a 5-week program focused on reinforcing the best practices in diabetes management through dietary practices, physical activity, and gaining self-confidence in managing T2D. The program was evaluated among 137 participants across 14 Texas counties using pre- and post-surveys that assessed the number of days per week participants engaged in diabetes self-care practices, as well as their confidence in performing these behaviors (rated on a scale from 1 = not at all confident to 5 = extremely confident). **Results:** Participants were mostly male (75.9%), White (60.6%), and over 65 years (58.4%). Most participants had T2D (57.7%) or prediabetes (27.0%). Compared to the program entry, participants reported improvements ($p < 0.001$) in self-care practices, as reflected by their mean differences (MD), including following a healthful eating plan (MD -1.46), consuming five servings of fruit and vegetables (MD -0.87), spacing carbohydrate intake evenly throughout the day (MD -1.64), engaging in at least 30 min of daily physical activity (MD -0.74), testing blood glucose (MD -1.08), and checking their feet (MD -1.09). Confidence in performing all self-care behaviors significantly improved ($p < 0.001$), with MDs between -0.53 and -1.13 , indicating higher post-program scores. **Conclusions:** Participation in the DWBWD program increased confidence in diabetes management and enhanced engagement in key health behaviors associated with reducing diabetes complications.

Keywords: type 2 diabetes; nutrition education; self-management; diabetes complications; self-efficacy



Academic Editor: Fabio Petrelli

Received: 1 August 2025

Revised: 9 September 2025

Accepted: 16 September 2025

Published: 2 October 2025

Citation: Venkatesh, S.; Alfaro Hudak, K.M.; Bably, M.B.; Rogus, S.M.; Krueger, D.; Fowler, H.; Laguros, M. Program Evaluation of Do Well, Be Well with Diabetes: Promoting Healthy Living in Adults with Type 2 Diabetes. *Diabetology* **2025**, *6*, 105. <https://doi.org/10.3390/diabetology6100105>

Copyright: © 2025 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The prevalence of type 2 diabetes (T2D) has increased significantly over the past two decades, with one in seven adults in the United States (U.S.) having the condition in 2017–2018 [1]. Such prevalence rates entail high societal and economic costs. T2D costs approximately \$413 billion in direct medical costs and indirect costs (e.g., lost productivity) [2].

Poorly controlled diabetes can lead to several health consequences including stroke, heart disease, nephropathy, retinopathy, and neuropathy [3]. Furthermore, individuals with diabetes have a 10% higher all-cause mortality compared with those without diabetes [4]. Nonetheless, healthy lifestyle modifications can play a significant role in effective diabetes management, thereby reducing adverse health effects. Specifically, improving diet quality, monitoring carbohydrate intake, regularly engaging in physical activity, and achieving a healthy body weight reduces the severity of the disease and related consequences [5,6]. However, making and maintaining lifestyle changes can be challenging.

Self-efficacy, i.e., the belief that one is capable of performing specific behaviors, is a primary determinant of successfully changing behaviors [7]. Substantial evidence indicates that diabetes self-efficacy has a strong, direct effect on implementing diabetes self-management behaviors [8–10]. Diabetes self-management education and support can improve self-efficacy and execution of self-management behaviors [8–10]. Thus, diabetes education and training programs have emerged as essential interventions to empower individuals with the skill, confidence, and knowledge necessary to effective self-care and make positive lifestyle modifications. Existing research has shown that diabetes education programs improve HbA1C control, reduce diabetes related distress, and enhance self-efficacy [11]. Bekele et al. (2020) found structured Diabetes Self-Management Education (DSME) improved knowledge, self-care behaviors, and self-efficacy among patients with T2D management and was effective in reducing HbA1C among individuals with T2D [12].

National level data from the 2017 U.S. Diabetes Knowledge survey showed that receiving DSME was strongly associated with higher self-efficacy, which in turn predicted improved and more frequent self-care behaviors in a nationally representative U.S. cohort [13]. Furthermore, the 2022 National Standards for DSME reinforce the importance of integrating self-advocacy, problem-solving, and psychosocial support into diabetes education programs [14]. Collectively, existing research confirms that diabetes education programs, whether community-based, virtual or peer-led, consistently improved self-care and self-efficacy among those with T2D [15–17].

Do Well, Be Well with Diabetes

Do Well, Be Well, with Diabetes (DWBWD) is an ongoing diabetes education program offered in both English and Spanish to Texas Extension clients. The program is open to all adults (18+ years) with prediabetes or T2D, friends or family members who support them, and those interested in learning more about T2D. The goal of the program is to educate participants about diabetes and blood glucose management and to equip them with the skills needed to understand and manage their condition, reduce their risks of complications, and attain their highest possible level of wellness through self-care practices. The program, however, is not a substitute for working closely with the participant's physician and healthcare team. The curriculum was originally developed in 2002 and was updated as needed. In 2014, major revisions to the curriculum and Supplemental Materials were made by Extension professionals within the Texas A&M AgriLife Extension Service. Since then, the curriculum has been periodically revised and updated to reflect current evidence-based content and participant needs.

The curriculum is based on the most current standards from the American Diabetes Association and the Academy of Nutrition and Dietetics. Table 1 outlines the key concepts delivered in each class. These topics are in support of the core diabetes self-care behaviors associated with DSME programs. The DWBWD curriculum focuses on building these core behaviors in a structured progression throughout the course. The program consists of a total of 5 classes, each designed to meet weekly and last approximately

2.5–3 h. Classes are typically taught in-person by trained instructors alongside a Power Point presentation and accompanying hands-on activities and handouts. The first class provides an overview of T2D, including how food affects blood glucose levels, and self-management strategies. Class 2 discusses the importance of checking blood glucose levels, how to do it, and carbohydrate counting. Class 3 teaches participants about the benefits of physical activity, types of physical activity, and dietary adjustments when engaging in activity. The fourth class discusses medications, estimating carbohydrates and portions when eating out, and alcohol. Class 5 provides information on the types of T2D complications, how to prevent and reduce the impact of complications, and reducing added sugars. Participants are directed to set self-management goals throughout the program. Each lesson includes a mini nutrition lecture with practical applications such as carbohydrate counting and the diabetes plate method. The curriculum also includes a toolkit with guides for implementation and planning, marketing materials, speaker suggestions, evaluation tools, and educational handouts.

Table 1. Topics covered in the *Do Well, Be Well with Diabetes* program and corresponding diabetes self-care practices.

Topics	Class 1	Class 2	Class 3	Class 4	Class 5
Overview of type 2 diabetes	x				
Healthy eating/nutrition	x	x	x *	x **	x
Nutrition label reading	x				
Carbohydrate counting and management	x	x	x	x	x
Blood glucose targets and HbA1C control	x	x			
Blood glucose monitoring and devise use/care		x			
Being active			x		
Preventing low or high blood glucose			x		
Medications				x	
Foot and skin care					x
Diabetes complications and preventive measures					x
Talking with healthcare professionals about diabetes	x	x	x	x	x

* Includes an optional handout on sodium with tips on using low-sodium spice blends. ** Includes an optional handout on saturated fats with tips on portion control, lean meats, low-fat dairy, reading nutrition labels, healthy cooking, and healthy-fat substitutions.

Despite clear improvements in behavioral and clinical outcomes, many studies focus primarily on clinical measures such as HbA1C and body weight, with less attention to sustained self-care adherence and self-efficacy. Moreover, relatively few programs explicitly assess both continued self-care behavior and internal psychological changes together. Therefore, the primary objective of this study was to evaluate the effect of participation in a community-based diabetes education program on participants’ regular adherence to diabetes self-care practices. The secondary objective was to assess the program’s effect on participants’ confidence in managing T2D.

2. Materials and Methods

2.1. Data Source

The study was approved by the Texas A&M University Institutional Review Board (STUDY2025-0729) to analyze and publish secondary data from the DWBWD program, collected between February 2024 and May 2025. This period was determined based on the transition of the DWBWD surveys to a new evaluation portal in February 2024. Therefore, we limited our sample to data available in the new system up to the time of preparing this article for publication (May 2025). Pre and post datasets were downloaded from the

evaluation portal managed by the Office of Data and Accountability at Texas A&M AgriLife Extension Service for further analysis to investigate the study objective. Data sets were merged using a unique identification number to compare pre- and post-program outcomes. A total of 184 participants completed the pre-program assessment, and 157 completed the post-program assessment. After excluding 19 individuals with no pre data, 46 with no post data, and one under 18 years, the final analytic sample consisted of 137 participants.

2.2. Instructor Training

DWBWD was implemented statewide by Texas A&M AgriLife Extension Service County Extension Agents (CEAs). The CEAs, who were the primary instructors, received regular training on program content and delivery from Extension Program Specialists specializing in diabetes education. Other eligible instructors included community health workers, dietitians, and healthcare providers. Training sessions were held in-person throughout the year based on the needs of the CEAs. Additionally, diabetes education training is provided to CEAs annually or every other year during Extension health summits and professional development sessions to deliver program updates and reinforce core knowledge. Training recordings for each class were also available for CEAs, external partners, or other instructors to access at any time.

2.3. Program Implementation

CEAs were encouraged to form an advisory committee to aid in the planning, implementation, recruiting, and teaching of the DWBWD program. Potential committee members included local healthcare professionals (such as physicians, pharmacists, and registered dietitians), members of the clergy, community members who have T2D, and media representatives. CEAs along with their advisory committees identified target audiences and implementation sites. CEAs had access to program materials and resources including an implementation guide, a program planning guide, media consent forms, training videos, as well as lesson plans, lectures, and handouts for each class. The implementation guide provided guidance on forming an advisory committee, teaching the classes, and resources that could be utilized for the program. The program planning guide included outlines of coalition duties, planning checklist, and a sample enrollment confirmation letter for participants.

The program was promoted through social media platforms (Twitter, Facebook, and Instagram) and partner websites, with enrollment managed by the CEAs. Participants were also recruited via outreach at community events, such as health fairs, and efforts were made to make classes available to the highest risk people in the community. Common recruiting sites included hospitals, clinics, pharmacies, nutrition and wellness centers, churches, and offices of healthcare providers. Classes were held in person, weekly, for approximately two hours per session and included presentations, hands-on activities, goal setting, and discussions. Classes were held at either partner sites, county offices, or other community facilities. Although CEAs served as the primary instructors, they were encouraged to invite healthcare professionals as guest speakers or involve them as appropriate for their expertise. Program costs varied between counties based on available funding and sponsorship, with an advised fee of under \$25 for those who want to attend. Food demonstrations and snacks were included at the discretion of the CEAs. CEAs were encouraged to either use recipes from the lesson plan or from the American Diabetes Association website [18].

2.4. Program Evaluation

The program outcomes were assessed using surveys administered during class at both the first session, before participants started the program, and the final session, after program completion. Surveys were available in both English and Spanish. Participants

completed evaluations either on paper or through a link to the online evaluation portal. Spanish surveys were available only in paper format and were entered into the system in English. CEAs or program partners/instructors were responsible for entering data from paper-based surveys into the evaluation portal. The evaluation surveys used in the DWBWD curriculum included validated questions from the Summary of Diabetes Self-Care Activities Measure (SDSCA) [19], which assesses key health behaviors. The Stanford Diabetes Self-Efficacy Scale (DSES) and its Spanish version (DSES-S) included all 8-item self-reported measures of diabetes self-efficacy [20]. A study by Ritter et al. reported the scale's reliability to be 0.828, showing good internal consistency [20]. The survey collected demographic and diabetes-related information, including diagnosis of T2D or pre-diabetes, HbA1C testing within the past 3 months if available, and whether they had a blood glucose monitoring device.

To assess behavior change, participants reported the number of days in the past week they engaged in specific self-care behaviors, with response options ranging from 1 to 7 days [19]. These behaviors included following a healthy eating plan, eating 5 or more servings of fruits and vegetables, eating high-fat foods, participating in at least 30 min of physical activity, spacing carbohydrates throughout the day, testing blood glucose, and checking feet. Participants' confidence in performing diabetes self-care behaviors was assessed using a 5-point Likert scale ranging from 1 (not at all confident) to 5 (extremely confident) [20]. Participants also had the option to choose "don't know/not sure" for each of these items, which were coded as missing information and excluded from the analysis when comparing means. The items for the confidence scale included maintaining regular meal frequency and timing, adhering to dietary recommendations when eating with others, choosing appropriate foods, engaging in physical activity, responding to abnormal blood glucose levels, determining when to seek medical care, and managing diabetes without it interfering with daily activities. The pre and post surveys are included as a Supplementary File to ensure transparency and to allow replication of the research. Chi-square tests were used to analyze demographic and baseline health information, while paired *t* tests assessed pre- and post-program changes in the frequency and confidence of adherence to diabetes self-care practices.

3. Results

3.1. Participant Characteristics

Participant characteristics are presented in Table 2. The final study sample included 137 participants from 14 counties in Texas, primarily from the East and Southeast regions. The sample was predominantly older adults ($n = 80$, 58.4%), with ages ranging from 19 to 96 years. Most participants identified as non-Hispanic White ($n = 83$, 60.6%) and reported diverse educational backgrounds. The majority of participants ($n = 100$, 73.5%) completed all 5 lessons.

Table 2. Demographic characteristics of participants in the *Do Well, Be Well with Diabetes* program ($n = 137$).

Participant Characteristics		<i>n</i> (%)
Age	18–44 years	23 (16.8)
	45–64 years	34 (24.8)
	≥65 years	80 (58.4)
Gender	Male	104 (75.9)
	Female	33 (24.1)

Table 2. Cont.

Participant Characteristics		n (%)
Race/Ethnicity	Non-Hispanic White	83 (60.6)
	Non-Hispanic Black	32 (23.4)
	Hispanic/Latino	18 (13.1)
	Other/prefer not to respond	3 (2.2)
Education	High school or less	53 (38.7)
	Some college/associate's degree	34 (24.8)
	College degree or higher	39 (28.5)
	Other/prefer not to respond	11 (8.0)

3.2. Diabetes and Health Status

Participants' baseline diabetes and health information is summarized in Table 3. Most participants had a diagnosis of diabetes ($n = 79$, 57.7%), while about one-fourth had prediabetes ($n = 37$, 27.0%). For the majority, this was their first diabetes education class ($n = 93$, 67.9%), and one-third reported attending to support a friend or family member with diabetes ($n = 46$, 33.6%). Just over half of participants had taken the HbA1C test within the past three months ($n = 80$, 58.4%) and owned a home blood glucose monitor ($n = 75$, 54.7%). However, HbA1C test results were available only for 66 participants, representing 48.2% of the sample. Among those with available data, 56 participants (40.9%) had a value of 7% or below, which is the recommended target for individuals with diabetes. About one-fourth were taking medications for diabetes ($n = 38$, 27.7%), and the majority reported having health insurance ($n = 115$, 83.9%).

Table 3. Baseline diabetes and health information of participants in the *Do Well, Be Well with Diabetes* program ($n = 137$).

Diabetes and Health Information	n (%)
Have type 2 diabetes	79 (57.7)
Have prediabetes	37 (27.0)
Attending their first diabetes class	93 (67.9)
Supporting family or friends with diabetes	46 (33.6)
Checked HbA1C in the past 3 months	80 (58.4)
Reported HbA1C test value of 7% or less *	56 (40.9)
Have a blood glucose monitor	75 (54.7)
Take medications or insulin for diabetes	38 (27.7)
Have health insurance	115 (83.9)

* Test values for HbA1C were available only for 66 participants (48.2%); 71 participants (51.8%) did not report; 10 (7.3%) had HbA1C above 7%.

3.3. Adherence to Diabetes Self-Care Practices

Participants' adherence to regular diabetes self-care practices before and after completing the program is reported in Table 4. On average, participants engaged in self-care practices between 2.56 and 4.82 days per week across both time points. Following program completion, participants demonstrated significant improvements ($p < 0.001$) in the average number of days per week they engaged in healthy dietary behaviors, including following a healthful eating plan (pre = 3.36 ± 2.19 vs. post = 4.82 ± 1.97), consuming 5 or more servings of fruits and vegetables daily (pre = 3.26 ± 2.28 vs. post = 4.13 ± 2.20), and spacing carbohydrates evenly throughout the day (pre = 2.77 ± 2.45 vs. post = 4.41 ± 2.23). However, there was no significant change in the consumption of high-fat foods (pre = 2.80 ± 1.69 vs. post = 2.56 ± 1.76 , $p = 0.238$). Likewise, participants showed significant improvements in the average number of days they engaged in at least 30 min of physical activity

(pre = 3.20 ± 2.45 vs. post = 3.95 ± 2.20), monitored their blood glucose (pre = 2.78 ± 3.11 vs. post = 3.87 ± 3.05), and checked their feet (pre = 3.12 ± 3.11 vs. post = 4.21 ± 3.03).

Table 4. Participants' adherence to diabetes self-care behaviors before and after attending the *Do Well, Be Well with Diabetes* program.

Diabetes Self-Care Practices	n	Number of Days/Week * Mean (SD)		Mean Difference (95% CI)	p
		Pre	Post		
Followed a healthful eating plan	121	3.36 (2.19)	4.82 (1.97)	−1.46 (−1.91, −1.00)	<0.001
Consumed ≥ 5 servings of fruits and vegetables	125	3.26 (2.28)	4.13 (2.20)	−0.87 (−1.34, −0.40)	<0.001
Spaced their carbohydrates evenly through the day	113	2.77 (2.45)	4.41 (2.23)	−1.64 (−2.20, −1.08)	<0.001
Consumed high-fat foods	122	2.80 (1.69)	2.56 (1.76)	0.24 (−0.16, 0.63)	0.238
Did at least 30 min of physical activity	129	3.20 (2.45)	3.95 (2.20)	−0.74 (−1.17, −0.32)	<0.001
Tested their blood sugar	119	2.78 (3.11)	3.87 (3.05)	−1.08 (−1.52, −0.65)	<0.001
Checked their feet	117	3.12 (3.11)	4.21 (3.03)	−1.09 (−1.64, −0.53)	<0.001

* Number of days per week participants engaged in self-care practices.

3.4. Confidence in Managing Diabetes Self-Care

Changes in participants' confidence levels in managing diabetes before and after the program are presented in Table 5. Across both timepoints, average confidence levels ranged from 2.56 to 3.93, reflecting a range from somewhat to very confident. Significant improvements ($p < 0.001$) were seen in all self-care areas. These included eating meals every 4 to 5 h (pre = 2.93 ± 1.18 vs. post = 3.60 ± 1.09), following their diet when sharing food with others (pre = 2.72 ± 1.10 vs. post = 3.69 ± 1.03), and choosing appropriate foods when hungry (pre = 2.66 ± 1.03 vs. post = 3.56 ± 0.97). Participants also improved their confidence in maintaining weekly physical activity (pre = 3.18 ± 1.35 vs. post = 3.71 ± 1.18) and in taking steps to prevent low blood glucose during exercise (pre = 2.80 ± 1.22 vs. post = 3.77 ± 1.04). Additionally, confidence increased in knowing what to do when blood glucose was high or low (pre = 2.56 ± 1.24 vs. post = 3.69 ± 1.02), judging when to seek help for illness (pre = 3.02 ± 1.17 vs. post = 3.93 ± 1.04), and controlling diabetes to avoid daily life interference (pre = 2.87 ± 1.09 vs. post = 3.83 ± 1.00).

Table 5. Participants' confidence in adhering to diabetes self-care behaviors before and after attending the *Do Well, Be Well with Diabetes* program.

Diabetes Self-Care Practices	n	Confidence Level * Mean (SD)		Mean Difference (95% CI)	p
		Pre	Post		
Eating meals every 4 to 5 h daily	116	2.93 (1.18)	3.60 (1.09)	−0.67 (−0.91, −0.44)	<0.001
Following diet when sharing food with others without diabetes	105	2.72 (1.10)	3.69 (1.03)	−0.96 (−1.24, −0.69)	<0.001
Choosing appropriate foods when hungry	120	2.66 (1.03)	3.56 (0.97)	−0.90 (−1.14, −0.66)	<0.001
Being physically active for 15–30 min, 4 to 5 times a week	120	3.18 (1.35)	3.71 (1.18)	−0.53 (−0.75, −0.30)	<0.001
Taking action to prevent blood glucose drops during exercise	99	2.80 (1.22)	3.77 (1.04)	−0.97 (−1.23, −0.71)	<0.001
Knowing what to do when blood glucose is high or low	104	2.56 (1.24)	3.69 (1.02)	−1.13 (−1.40, −0.87)	<0.001
Judging when to get help for illness changes	107	3.02 (1.17)	3.93 (1.04)	−0.92 (−1.19, −0.64)	<0.001
Controlling diabetes to avoid interference with daily life	98	2.87 (1.09)	3.83 (1.00)	−0.96 (−1.21, −0.71)	<0.001

* Scale range: 1 = not at all confident; 2 = somewhat confident; 3 = confident; 4 = very confident; 5 = extremely confident.

4. Discussion

This study aimed to examine whether participation in a community-based diabetes education program improved participants' regular adherence to diabetes self-care practices and their confidence in managing T2D. The majority of DWBWD participants were male, older adults, and non-Hispanic White. These demographic characteristics differ from

those reported in prior literature on diabetes education programs in several ways. An analysis of 14,747 individuals who participated in a National Diabetes Prevention Program (DPP) between 2012 and 2016 found that the majority were female (80.3%) and in the 45–64 years age range (56.0%), and less than half (44.9%) were non-Hispanic White [21]. These differences may at least partially be attributable to differences in program reach and structure. Participants in the DPP were from 40 states across the U.S., compared to our sample, which was from 14 counties across Texas. In addition, the National DPP is a year-long program, which may affect participant composition. Nationally, the estimated prevalence of diabetes in 2016–2017 was significantly higher in older adults (65 years and older, 19.8%) compared to other age groups: 2.9% in adults 20–44 years and 12.4% in those ages 45–64 years [22]. Prevalence rates were slightly higher in men (10.2%) compared to women (8.6%). While the demographic characteristics of the DWBWD sample reflect these national prevalence estimates, the DWBWD sample diverges from race/ethnicity estimates. That is, national diabetes prevalence rates in 2016–2017 were highest in those of “Other” or non-Hispanic Black race/ethnicity [22], while the majority of our study sample was non-Hispanic White.

Encouragingly, our study observed improvements in adherence to key self-care areas including diet, physical activity, blood glucose monitoring, and foot care which align with outcomes from similar diabetes education programs. Chrvala et al. (2016) reviewed 118 unique interventions and found that DSME significantly reduced HbA1C levels [11]. Weise et al. (2024) highlighted the effectiveness of incorporating physical activity guidance into DSME, showing that structured exercise recommendations improved adherence and reduced risks related to inactivity and neuropathy [13]. Park et al. (2024) reported enhanced adherence to routine self-care practices, such as blood glucose monitoring, healthy eating, and foot care, especially when programs used culturally tailored and interactive education [2]. Collectively, these studies support our findings and underscore the value of comprehensive, behavior-focused education strategies in diabetes management.

Overall confidence in diabetes self-care improved after participating in the program. Significant improvements were observed across all measures, including those for diet, physical activity, responding to spikes or dips in blood sugar, and knowing when to see the doctor. The increase in self-efficacy following diabetes education aligns with findings from other studies [8,23–25]; however, comparisons are challenging due to the use of different self-efficacy scales across studies. Moreover, most studies only report overall self-efficacy rather than average responses to individual questions that comprise the scale. Research has demonstrated that self-efficacy mediates the link between diabetes education and action on recommended diet, physical activity, glucose self-monitoring, and foot care behaviors [9]. The reported increase in self-efficacy following participation in this program suggests that it has the potential to contribute to long-term positive health outcomes for participants.

Most of our program participants were attending their first diabetes education class, and nearly half did not have a recent HbA1C test or own a home blood glucose monitor. These findings highlight potential gaps in routine monitoring of blood sugar levels, which represents a significant barrier to effective self-management of diabetes. Controlling blood glucose levels and achieving glycemic targets can halt or slow progression of the disease and minimize the risk of serious macrovascular (e.g., cardiovascular disease, stroke) and microvascular (e.g., retinopathy, neuropathy, and nephropathy) complications [26–29]. Thus, monitoring and controlling blood glucose levels is a critical component of managing diabetes.

Half (52%) of the study sample had missing data for HbA1C. Among those who reported HbA1C measurements, the majority had good glycemic control (i.e., HbA1C $\leq$ 7%) at baseline. However, diabetes control may differ between participants with and without

HbA1C data. The frequency of HbA1C testing is determined by individual physician recommendations. According to the American Diabetes Association, individuals meeting their HbA1C goals should test twice a year, whereas those with poor control are advised to test more frequently, typically every three months [30]. Thus, participants with HbA1C measurements may represent either those requiring closer monitoring or those who are more motivated to actively manage their diabetes by undergoing regular testing [31]. Therefore, it is not possible to know whether or in what direction the missing HbA1c data may bias the findings on glycemic control at baseline. Additionally, our sample also included participants' friends and family members who attended the program to learn about caring for someone with diabetes. Therefore, the findings on baseline HbA1C should be interpreted with caution, as this group may have included healthy individuals.

The data in Table 3 highlights the frequency of self-care diabetes practices among participants, showing they engaged in these behaviors an average of 2.56 to 4.82 days per week. While this indicates moderate adherence, it also points to a need for greater consistency, particularly in daily management practices. Notably, there were no significant changes in high-fat food consumption, which may suggest ongoing challenges in reducing dietary fat intake. The DWBWD curriculum included optional activities on sodium and saturated fats. While these activities were considered important resources, they were often not covered due to time constraints. Our findings suggest that greater emphasis should be placed on allocating sufficient time to complete these optional activities during class to see positive changes in this component. Although fat consumption does not directly affect blood glucose levels, diets high in saturated fats are associated with increased risk of heart disease, a common comorbidity among individuals with diabetes. Moreover, reducing saturated fat intake has been shown to support long-term health [32]. As such, diabetes education should continue to emphasize the role of healthy fats in overall disease management.

Our findings suggest that participation in a diabetes education program could improve not only adherence to diabetes self-care behaviors but also participants' self-efficacy in managing their condition. As noted previously, self-efficacy is a major contributor to behavior change. Our study showed that community-based diabetes education programs are a viable option for enhancing self-efficacy and subsequently improving diabetes self-care behaviors.

4.1. Strengths and Limitations

The study provides insight into the effectiveness of diabetes self-care among individuals attending educational classes for the first time. Limiting prior exposure to diabetes self-care practices allows for a greater understanding of participants' true confidence and behaviors, highlighting the importance of reaching newly diagnosed individuals or those in the early stages of the disease through community-based education. This study has certain limitations. Our sample represents a limited geographic area and has demographic characteristics that are not generalizable to other geographic locations or populations. Similarly, we recognize that the sample demographics were relatively homogenous and may not represent the broader population of individuals with diabetes in Texas. Second, the data collected for pre- and post-evaluations relied on self-reported data. Therefore, participant responses may have response bias. We also did not include a control group or collect follow-up data beyond the program period.

Furthermore, lacking survey collection dates limits our ability to calculate the mean and standard deviation between the first and final sessions and evaluate the impact of program duration on outcomes. Although the classes were designed as a five-week pro-

gram, there was variability in schedule. While intended to be held weekly, instructors determined the schedule based on their cohort, with some offering sessions weekly while others biweekly. Additionally, because the program was conducted year-round, holidays may have periodically interrupted the class schedule. The evaluation portal only recorded the dates when data was entered into the system, not the actual class dates or survey collection dates. In many cases, pre- and post-data were entered together on a date different from when they were actually collected.

The study design, sampling strategy, and evaluation measures were primarily intended for program evaluation and internal reporting purposes. Future studies should expand survey collections across other regions and include more diverse populations for a broader representation. Future research should focus on collecting clinical and behavior data at baseline and again at 3- to 6-month post-intervention. Additionally, assessment of diabetes-related complications, healthcare costs, and healthcare utilization would provide a more comprehensive understanding of the impact of community-based diabetes education programs. Studies may also benefit from including a comparison group and assessing long-term outcomes to determine program effectiveness and the sustainability of results. The opportunity to follow up with these participants through long-term surveys would provide valuable insights into the maintenance of their self-efficacy in diabetes-related dietary and lifestyle behaviors. Tracking changes in confidence over time offers valuable insights and helps identify future intervention windows to sustain and reinforce dietary behaviors and confidence in those with diabetes. This approach could ultimately strengthen the evidence and reliability of improved glycemic control related to these targeted self-management behaviors in a community-based program.

4.2. Perspectives for Clinical Practice

This study also has implications for clinical practice. DSME programs are considered to be an essential component of comprehensive diabetes medical care [33]. Such programs improve outcomes and quality of life for patients and are cost effective [33]. Further, more time spent with diabetes educators has been associated with better outcomes [34]. A recent consensus report recommended referral to DSME programs at four critical times: at diagnosis, every year or when not meeting treatment targets, when complicating factors develop, and when transitions in life and care occur [33]. This suggests that ensuring the accessibility of DSME programs in both community and clinical settings could be beneficial for patients.

Despite their benefits, DSME programs continue to be underutilized; few patients are referred to them and their accessibility remains limited [33]. Extension has helped to address accessibility by expanding the settings within which classes are offered. Historically, DSME programs and support services were provided for people with diabetes and their family members at a hospital-based/healthcare facility location [33]. The modern take on class locations now includes community health centers, pharmacies, faith-based organizations and additional venues [33]. DWBW classes are held in a wide variety of settings and may involve collaborations between Extension agents, community health workers, dietitians, and healthcare providers. Further understanding the barriers to DSME program offerings and participation can improve the reach and effectiveness of these programs.

Furthermore, The American College of Lifestyle Medicine reviewed multiple scientific guidelines, systematic reviews, and randomized clinical trials, and emphasized a strong recommendation for clinicians to advocate lifestyle interventions as an essential strategy to improve the quality of care for individuals with T2D [35]. Lifestyle medicine emphasizes six key pillars for the prevention and treatment of chronic diseases, including optimal nutrition, physical activity, stress management, restorative sleep, avoidance of risky substances, and

fostering positive social connections [36]. These principles are covered in evidence-based diabetes education programs such as DWBWD, which is guided by the standards of the American Diabetes Association and the Academy of Nutrition and Dietetics, and incorporates the DSME framework to support patient self-management. When clinical care is integrated with evidence-based educational programs, it can help improve diabetes-related knowledge and introduce behavior change, which may not be often covered in-depth during regular physician visits.

Clinicians can extend patient care beyond the clinic through referrals to diabetes education classes offered through local Extension offices, thereby integrating medical treatment with practical diabetes self-care education. This approach could empower patients in their self-management, enhance self-efficacy, and promote better long-term blood glucose management. Such collaborations may help lower healthcare costs and reduce the risk of diabetes-related complications. Since DWBWD classes are offered in group settings, they can also serve as informal support groups connecting individuals with T2D who share similar goals and challenges. Additionally, these classes provide an opportunity for healthcare professionals, including physicians, nurses, dietitians, and health coaches, to serve as guest speakers. By offering education and resources, they can engage with patients beyond the clinical setting, enhancing knowledge and providing support to individuals with T2D. Lastly, because diabetes treatment and care may vary based on individual needs, diabetes education programs should clearly emphasize that any questions related to medical care should always be directed to the physician. These classes are designed mainly to raise awareness of disease management and empower participants to make informed choices and maintain healthy behaviors.

5. Conclusions

Community-based diabetes programs provide an opportunity to educate and empower people with diabetes to build confidence in self-care practices. Consistent self-care is an essential part of diabetes management, and diabetes education can positively impact self-care behaviors. The results of this study indicate that the DWBWD program can improve participant adherence to diabetes self-care practices, particularly dietary management, physical activity, and blood glucose monitoring. It can also increase participant's confidence in managing diabetes. These findings provide meaningful implications for practice, community outreach, Cooperative Extension agencies, and future research in community-based diabetes programming. Clinical practitioners and trained health educators should promote interventions that teach core self-care practices while building self-efficacy, as confidence in performing these daily activities is key to consistent, long-term diabetes management. Encouraging their involvement may further enhance participant confidence and adherence and should be considered in future program design and evaluation.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/diabetology6100105/s1>. Survey S1: Pre-post evaluation survey for measuring program outcomes.

Author Contributions: S.V. conceptualized the study, performed data analysis, and contributed to draft preparation and final review; K.M.A.H., S.M.R. and M.B.B. conducted and summarized the literature review and contributed to draft preparation and final review; D.K., one of the original curriculum authors and former program specialist, contributed to draft preparation and final review; H.F. and M.L., the current program specialists overseeing program development and educator training, contributed to draft preparation and final review. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board (or Ethics Committee) of Texas A&M University (STUDY2025-0729 approved on 23 July 2025).

Informed Consent Statement: Informed consent waived due to secondary data analysis.

Data Availability Statement: The data sets presented in this article are not publicly available because they are managed by the Office of data and Accountability at Texas A&M AgriLife Extension service. Data may be available upon request by contacting the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

CEA	County Extension Agent
DWBWD	Do Well, Be Well with Diabetes
MD	Mean Differences
DSME	Diabetes Self-Management Education
HbA1C	Hemoglobin A1c
T2D	Type 2 Diabetes
U.S.	United States

References

- Wang, L.; Li, X.; Wang, Z.; Bancks, M.P.; Carnethon, M.R.; Greenland, P.; Feng, Y.-Q.; Wang, H.; Zhong, V.W. Trends in Prevalence of Diabetes and Control of Risk Factors in Diabetes Among US Adults, 1999–2018. *JAMA* **2021**, *326*, 704–716. [\[CrossRef\]](#)
- Parker, E.D.; Lin, J.; Mahoney, T.; Ume, N.; Yang, G.; Gabbay, R.A.; ElSayed, N.A.; Bannuru, R.R. Economic Costs of Diabetes in the U.S. in 2022. *Diabetes Care* **2024**, *47*, 26–43. [\[CrossRef\]](#)
- Zheng, Y.; Ley, S.H.; Hu, F.B. Global Aetiology and Epidemiology of Type 2 Diabetes Mellitus and Its Complications. *Nat. Rev. Endocrinol.* **2018**, *14*, 88–98. [\[CrossRef\]](#)
- Li, S.; Wang, J.; Zhang, B.; Li, X.; Liu, Y. Diabetes Mellitus and Cause-Specific Mortality: A Population-Based Study. *Diabetes Metab. J.* **2019**, *43*, 319–341. [\[CrossRef\]](#) [\[PubMed\]](#)
- Pillon, N.J.; Loos, R.J.F.; Marshall, S.M.; Zierath, J.R. Metabolic Consequences of Obesity and Type 2 Diabetes: Balancing Genes and Environment for Personalized Care. *Cell* **2021**, *184*, 1530–1544. [\[CrossRef\]](#)
- Ahmad, E.; Lim, S.; Lamptey, R.; Webb, D.R.; Davies, M.J. Type 2 Diabetes. *Lancet* **2022**, *400*, 1803–1820. [\[CrossRef\]](#) [\[PubMed\]](#)
- Bandura, A. Self-Efficacy: Toward a Unifying Theory of Behavioral Change. *Psychol. Rev.* **1977**, *84*, 191–215. [\[CrossRef\]](#) [\[PubMed\]](#)
- Jiang, X.; Wang, J.; Lu, Y.; Jiang, H.; Li, M. Self-Efficacy-Focused Education in Persons with Diabetes: A Systematic Review and Meta-Analysis. *Psychol. Res. Behav. Manag.* **2019**, *12*, 67–79. [\[CrossRef\]](#)
- Juarez, L.D.; Presley, C.A.; Howell, C.R.; Agne, A.A.; Cherrington, A.L. The Mediating Role of Self-Efficacy in the Association Between Diabetes Education and Support and Self-Care Management. *Health Educ. Behav.* **2022**, *49*, 689–696. [\[CrossRef\]](#)
- Jiang, X.; Jiang, H.; Li, M. The Role of Self-Efficacy Enhancement in Improving Self-Management Behavior for Type 2 Diabetes Mellitus Patients. *Diabetes Metab. Syndr. Obes.* **2024**, *17*, 3131–3138. [\[CrossRef\]](#)
- Chrvala, C.A.; Sherr, D.; Lipman, R.D. Diabetes Self-Management Education for Adults with Type 2 Diabetes Mellitus: A Systematic Review of the Effect on Glycemic Control. *Patient Educ. Couns.* **2016**, *99*, 926–943. [\[CrossRef\]](#)
- Bernardo, G.L.; Jomori, M.M.; Fernandes, A.C.; Colussi, C.F.; Condrasky, M.D.; Proença, R.P.D.C. Nutrition and Culinary in the Kitchen Program: A Randomized Controlled Intervention to Promote Cooking Skills and Healthy Eating in University Students—Study Protocol. *Nutr. J.* **2017**, *16*, 83. [\[CrossRef\]](#)
- Weise, S.; Du, Y.; Heidemann, C.; Baumert, J.; Frese, T.; Heise, M. Diabetes Self-Management Education Programs: Results from a Nationwide Population-Based Study on Characteristics of Participants, Rating of Programs and Reasons for Non-Participation. *PLoS ONE* **2024**, *19*, e0310338. [\[CrossRef\]](#) [\[PubMed\]](#)
- Davis, J.; Fischl, A.H.; Beck, J.; Browning, L.; Carter, A.; Condon, J.E.; Dennison, M.; Francis, T.; Hughes, P.J.; Jaime, S.; et al. 2022 National Standards for Diabetes Self-Management Education and Support. *Diabetes Care* **2022**, *45*, 484–494. [\[CrossRef\]](#)
- Zaini, N.; Idris, I.B.; Ahmad, N.; Hashim, S.M.; Abdullah, N.N.; Shamsusah, N.A. Enhancing Self-Care Management among Women with Type 2 Diabetes Mellitus. *Sci. Rep.* **2025**, *15*, 13093. [\[CrossRef\]](#)

16. Tang, F.; Zhong, X.; Liu, S.; Guo, X.; Li, D. Pathway Analysis of the Impact of Health Literacy, Social Support and Self-Efficacy on Self-Management Behaviors in Pregnant Women with Gestational Diabetes Mellitus. *Front. Public Health* **2023**, *11*, 1188072. [CrossRef] [PubMed]
17. Morello, C.M.; Fricovsky, E.S. Long-Term Impact of Sustained Knowledge, Confidence, and Clinical Application Following a First-Year Student Pharmacist Diabetes Self-Care Education Program. *Pharmacy* **2025**, *13*, 42. [CrossRef]
18. American Diabetes Association. Diabetes Food Hub. Available online: <https://diabetesfoodhub.org> (accessed on 1 July 2025).
19. Toobert, D.J.; Hampson, S.E.; Glasgow, R.E. The Summary of Diabetes Self-Care Activities Measure: Results from 7 Studies and a Revised Scale. *Diabetes Care* **2000**, *23*, 943–950. [CrossRef] [PubMed]
20. Ritter, P.L.; Lorig, K.; Laurent, D.D. Characteristics of the Spanish- and English-Language Self-Efficacy to Manage Diabetes Scales. *Diabetes Educ.* **2016**, *42*, 167–177. [CrossRef]
21. Ely, E.K.; Gruss, S.M.; Luman, E.T.; Gregg, E.W.; Ali, M.K.; Nhim, K.; Rolka, D.B.; Albright, A.L. A National Effort to Prevent Type 2 Diabetes: Participant-Level Evaluation of CDC’s National Diabetes Prevention Program. *Diabetes Care* **2017**, *40*, 1331–1341. [CrossRef]
22. Xu, G.; Liu, B.; Sun, Y.; Du, Y.; Snetselaar, L.G.; Hu, F.B.; Bao, W. Prevalence of Diagnosed Type 1 and Type 2 Diabetes among US Adults in 2016 and 2017: Population Based Study. *BMJ* **2018**, *362*, k1497. [CrossRef]
23. Jiang, X.-J.; Jiang, H.; Chen, Y.; Wu, X.-A.; Yu, X.-L.; Liu, L.; Li, M.-Z. The Effectiveness of a Self-Efficacy-Focused Structured Education Program (SSEP) in Improving Metabolic Control and Psychological Outcomes of Type 2 Diabetes Patients: A 12-Month Follow-Up of a Multicenter Randomized Controlled Trial. *DMSO* **2021**, *14*, 305–313. [CrossRef]
24. Dunkel, A.; Von Storch, K.; Hochheim, M.; Zank, S.; Polidori, M.C.; Woopen, C. Long-Term Effects of Transtheoretical Model-Based Lifestyle Intervention on Self-Efficacy and Self-Management in Patients with Type 2 Diabetes—Randomised Controlled Trial. *Int. J. Behav. Med.* **2025**, *32*, 45–57. [CrossRef] [PubMed]
25. Mergelsberg, E.L.P.; Olson, J.L.; Moore, S.; Jensen, J.F.; Seivwright, H.; Norman, R.; Watson, N.A. Providing Evidence from Practice: Evaluating 4.5 Years of Implementing Diabetes Education Support Program in Carbohydrate Management. *Patient Educ. Couns.* **2022**, *105*, 2225–2233. [CrossRef] [PubMed]
26. Chatterjee, S.; Davies, M.J.; Heller, S.; Speight, J.; Snoek, F.J.; Khunti, K. Diabetes Structured Self-Management Education Programmes: A Narrative Review and Current Innovations. *Lancet Diabetes Endocrinol.* **2018**, *6*, 130–142. [CrossRef]
27. Gæde, P.; Vedel, P.; Larsen, N.; Jensen, G.V.H.; Parving, H.-H.; Pedersen, O. Multifactorial Intervention and Cardiovascular Disease in Patients with Type 2 Diabetes. *N. Engl. J. Med.* **2003**, *348*, 383–393. [CrossRef]
28. The ADVANCE Collaborative Group. Intensive Blood Glucose Control and Vascular Outcomes in Patients with Type 2 Diabetes. *N. Engl. J. Med.* **2008**, *358*, 2560–2572. [CrossRef] [PubMed]
29. UK Prospective Diabetes Study (UKPDS) Group. Effect of Intensive Blood-Glucose Control with Metformin on Complications in Overweight Patients with Type 2 Diabetes (UKPDS 34). *Lancet* **1998**, *352*, 854–865. [CrossRef]
30. American Diabetes Association Professional Practice Committee; ElSayed, N.A.; McCoy, R.G.; Aleppo, G.; Balapattabi, K.; Beverly, E.A.; Briggs Early, K.; Bruemmer, D.; Echouffo-Tcheugui, J.B.; Ekhlaspour, L.; et al. 6. Glycemic Goals and Hypoglycemia: Standards of Care in Diabetes—2025. *Diabetes Care* **2025**, *48*, S128–S145. [CrossRef]
31. Weiss, T.; Edwards, A.; Lautsch, D.; Rajpathak, S.; Snow, K. Hemoglobin A1C Testing Frequency among Patients with Type 2 Diabetes within a US Payer System: A Retrospective Observational Study. *Curr. Med. Res. Opin.* **2021**, *37*, 1859–1866. [CrossRef]
32. Hooper, L.; Martin, N.; Jimoh, O.F.; Kirk, C.; Foster, E.; Abdelhamid, A.S. Reduction in Saturated Fat Intake for Cardiovascular Disease. *Cochrane Database Syst. Rev.* **2020**, *5*, CD011737. [CrossRef] [PubMed]
33. Powers, M.A.; Bardsley, J.K.; Cypress, M.; Funnell, M.M.; Harms, D.; Hess-Fischl, A.; Hooks, B.; Isaacs, D.; Mandel, E.D.; Maryniuk, M.D.; et al. Diabetes Self-Management Education and Support in Adults With Type 2 Diabetes: A Consensus Report of the American Diabetes Association, the Association of Diabetes Care & Education Specialists, the Academy of Nutrition and Dietetics, the American Academy of Family Physicians, the American Academy of PAs, the American Association of Nurse Practitioners, and the American Pharmacists Association. *Diabetes Care* **2020**, *43*, 1636–1649. [CrossRef] [PubMed]
34. American Diabetes Association Professional Practice Committee. 5. Facilitating Positive Health Behaviors and Well-Being to Improve Health Outcomes: Standards of Care in Diabetes-2025. *Diabetes Care* **2025**, *48*, S86–S127. [CrossRef]
35. Rosenfeld, R.M.; Grega, M.L.; Karlsen, M.C.; Abu Dabrh, A.M.; Aurora, R.N.; Bonnet, J.P.; Donnell, L.; Fitzpatrick, S.L.; Frates, B.; Joy, E.A.; et al. Lifestyle Interventions for Treatment and Remission of Type 2 Diabetes and Prediabetes in Adults: A Clinical Practice Guideline from the American College of Lifestyle Medicine. *Am. J. Lifestyle Med.* **2025**, *19*, 10S–131S. [CrossRef]
36. Stubbe, C. Nursing’s Role in Lifestyle Medicine. *ANJ* **2023**, *18*, 23–27. [CrossRef]

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.