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## Latinos Living Well—A Diabetes Education Program for Rural-Residing Latinos

Michelle N. Keane

*C.S. Mott Children's Hospital and Von Voigtlander Women's Hospital*

Sarah L. Francis

*Iowa State University, slfranci@iastate.edu*

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### Abstract

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### Keywords

diabetes education, diabetes self-management, Latinos, rural, self-efficacy

### Disciplines

Endocrinology, Diabetes, and Metabolism | Family, Life Course, and Society | Food Science | Human and Clinical Nutrition | Latin American Studies

### Comments

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**Keywords:** [diabetes education](#), [diabetes self-management](#), [Latinos](#), [rural](#), [self-efficacy](#)

**Michelle N. Keane**  
Food Service Manager  
C.S. Mott Children's  
Hospital and Von  
Voigtlander Women's  
Hospital  
Ann Arbor, Michigan  
[keanemi@med.umich.edu](mailto:keanemi@med.umich.edu)

**Sarah L. Francis**  
Associate Professor  
Department of Food  
Science and Human  
Nutrition  
Iowa State University  
Ames, Iowa  
[sfranci@iastate.edu](mailto:sfranci@iastate.edu)  
[@IAStateFSHN](#)

## Introduction

Type 2 diabetes mellitus (diabetes) among Latinos is a public health concern. Latinos have a higher diabetes incidence (11.9%) than non-Latino Whites (7.3%) (Centers for Disease Control and Prevention [CDC], 2017). Additionally, 31.7% of Latino adults have prediabetes (CDC, 2017). Despite their higher risk for and incidence of diabetes, 41.3% of Latinos are unaware of their diabetes status (Schniederma et al., 2014).

Several factors place Latinos at higher diabetes risk and severity. First, one third (34.1%) lack health insurance (National Center for Health Statistics, 2017); thus it is likely that physician care, diabetes diagnoses, and referrals to diabetes self-management (DMSM) programs are limited. Second, acculturation influences diabetes risk (O'Brien, Alos, Davey, Bueno, & Whitaker, 2014). As immigrants adopt U.S. cultural practices, diet quality decreases (Perez-Escamilla & Putnik, 2007), potentially leading to weight gain (Oza-Frank & Cunningham, 2010) and thereby raising diabetes risk (Perez-Escamilla & Putnik, 2007). Additionally, rurality may exacerbate diabetes risk due to limited health care access (Meit et al., 2014), less formal education (Hale, Bennet, & Probst, 2010), lower income levels (Hale et al., 2010), fewer physical activity (PA) opportunities (Meit et al., 2014), and limited access to affordable nutrient-dense foods (Smith & Morton, 2009) as compared to the circumstances of those

living in urban areas. Furthermore, communication challenges, health illiteracy, discrimination, and mistrust of the health care system place Latinos at a disadvantage for receiving DMSM education (Cristancho, Garces, Peters, & Mueller, 2008). These factors increase diabetes risk and decrease the opportunity to manage it ("Facts about Type 2," 2015; Hu, Amirehsani, Wallace, & Letvak, 2013).

Culturally appropriate DMSM education programs for rural-residing Latinos are needed to help them prevent and/or manage diabetes. Extension is well positioned to fulfill this need as it naturally overcomes several barriers faced by Latinos needing diabetes education. Specifically, it is available nationwide, including in rural areas; is not affiliated with local health care agencies; does not require participants to have health insurance; and can provide diabetes education services for free or at reduced prices.

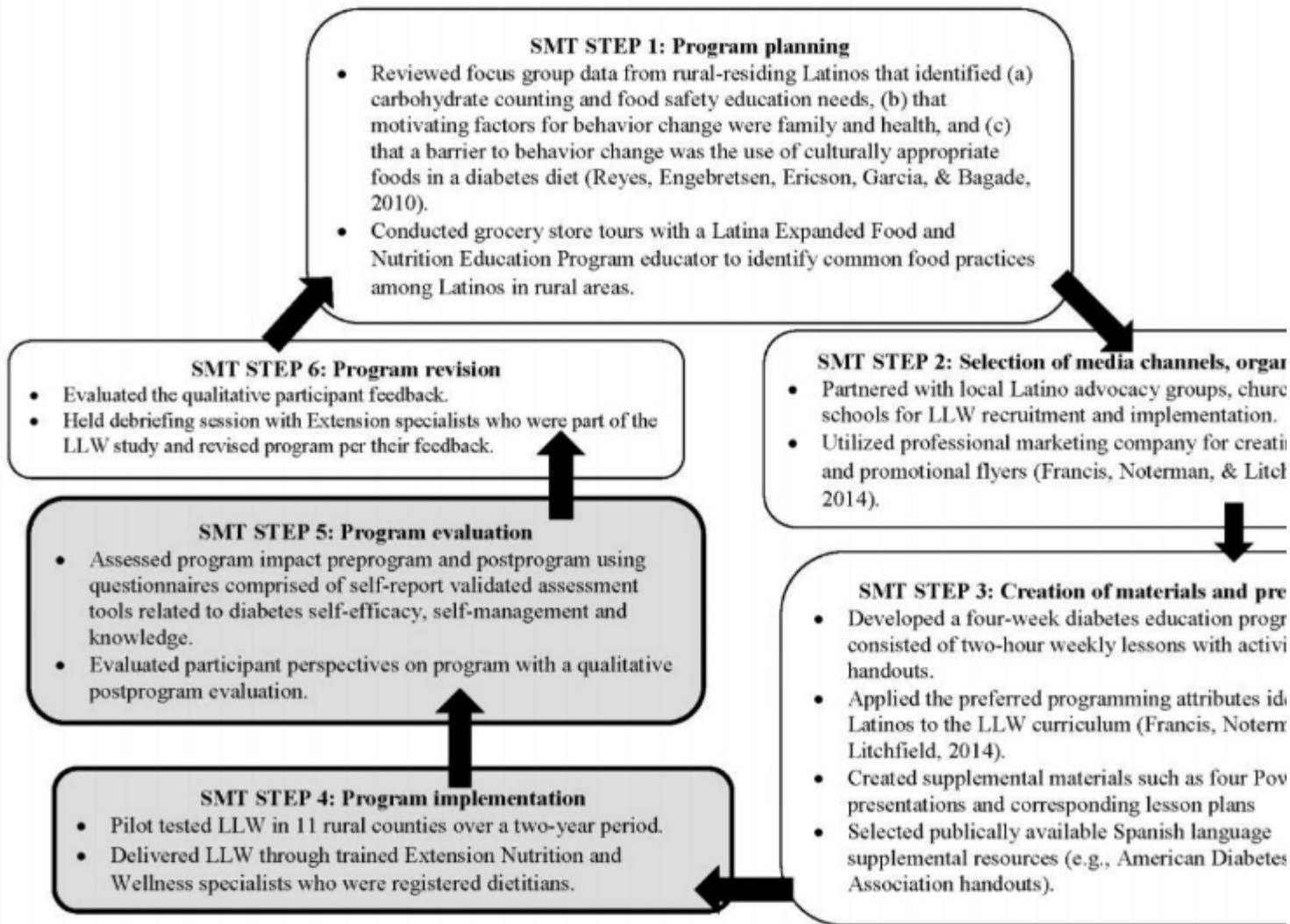
## Latinos Living Well

Latinos Living Well (LLW) is based on two Extension programs, Dining with Diabetes (DWD) ("Dining with Diabetes," 2017) and Kitchen Creations (KC) (Archuleta et al., 2012). DWD improves blood glucose control (Burcham, 2009; "Dining with Diabetes," 2017) and knowledge (Chapman-Novakofski & Karduck, 2005), and KC improves nutrient intake patterns and knowledge (Archuleta et al., 2012). Neither has been examined for the purpose of determining the impact of a multiweek DMSM program on diabetes self-efficacy (DMSE) among rural-residing Latinos.

LLW has its foundation in social marketing theory (SMT) (Storey, Saffitz, & Rimón, 2008) and the health belief model (HBM) (Champion & Skinner, 2008). SMT, a program development theory, centers on using the target audiences' needs and preferences to guide program development (Storey et al., 2008). SMT ensures that a program is designed specifically for the target audience, thus increasing the likelihood of program acceptance and success. Figure 1 describes the application of SMT concepts during the development of LLW.

### Figure 1.

The Social Marketing Theory (SMT) Process in the Development of Latinos Living Well (LLW)



Note: Shaded boxes indicate the SMT constructs being addressed by the current study.

## LLW Description

LLW is a 4-week program delivered in Spanish that focuses on diet and PA for Latinos regardless of diabetes status. The weekly topics are diabetes basics, label reading, beans and vegetables, and fats and sodium. Each lesson includes activities that address at least one HBM construct (Table 1).

**Table 1.**  
Latinos Living Well Health Belief Model (HBM) Activity Checklist

Topic/activity	HBM categories and concepts					
	Individual perceptions		Likelihood of action		Moderators	
	Perceived severity	Perceived susceptibility	Changeable & unchangeable attributes	Cues to action	Self-efficacy	Perceived benefits
Overview of diabetes (Lesson 1)	X	X	X			

Risk factors			
Types of diabetes			
Influence of lifestyle			
Hands-on group activities	X	X	X
Carbohydrate counting/label reading (Lessons 1–3)			
Product taste-testing (Lesson 2)			
Sugar-free foods			
Low-fat foods			
Identifying whole grains (Lesson 2)			
Cooking practicum (Lessons 2–4)			
Physical activity break (Zumba) (Lessons 2–4)			
Health benefits of eating beans and other vegetables (Lesson 3)	X		X
Motivators and barriers	X		X
Physical activity changes (Lessons 2–4)			
Healthful eating and diet changes (Lessons 2–4)			
Cooking legumes (Lesson 3)			
Goal setting (Lessons 1–4)		X	X

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Because LLW is delivered in Spanish, non-Spanish-speaking specialists worked with local interpreters to provide the pilot implementation of the program. Additionally, sessions were led by Extension specialists who were registered dietitians (RDs). LLW lessons are scripted in both Spanish and English to ensure consistent messaging regardless of specialist or interpreter. Specialists attended an LLW training workshop developed and conducted by author team member Sarah Francis. The training addressed Latino-preferred marketing strategies, cross-cultural communication best practices, curriculum review, and cooking practicums.

## Methodology

### Participants and Recruitment

LLW was implemented in 11 rural Midwest counties. The research protocol was reviewed by Iowa State University's institutional review board and classified as exempt. A convenience sample of 120 rural-residing Latinos aged 18-plus years, regardless of diabetes status, was recruited through (a) collaboration with established Latino-serving community groups, (b) radio commercials aired on local Latino stations, (c) print media, and (d) word of mouth.

LLW was held at locations accessible to participants. Participants received several small items for participating that supported the mission of LLW, such as diabetes education handouts and the cookbook *Diabetic Cooking for Latinos* (Fuste, 2002).

### Program Evaluation

Participants completed a six-page Spanish questionnaire, comprised of several validated tools, at the start of Lesson 1 (preprogram) and at the end of Lesson 4 (postprogram); this took about 45 min.

The Diabetes Self-Efficacy Scale ( $\alpha = 0.87$ ) measured DMSE with a Likert scale ranging from 1 (*not sure at all*) to 4 (*very sure*) that participants used to rate their confidence regarding 10 health-related abilities (Skaff, Mullan, Fisher, & Chesla, 2003). The average of a participant's responses to the 10 questions was calculated, for a final maximum score of 4.

The validated Diabetes Self-Care Activities Measure (Toobert, Hampson, & Glasgow, 2000) assessed DMSM. Participants reported how often they adhered to behaviors in each of three categories: (a) general diet—the frequency of following a personal healthful eating plan; (b) specific diet—eating fruits and vegetables, limiting high-fat foods; and (c) exercise activities (Toobert et al., 2000). For each category, participants identified how many of the preceding 7 days and, on average, how many days per week over the preceding month he or she had adhered to the DMSM activities. The average of a participant's responses to those two questions in each category was calculated, for a maximum score of 7 in each category—general diet, specific diet, and exercise self-care (Toobert et al., 2000).

Knowledge was evaluated via the Diabetes Knowledge Test ( $\alpha = 0.70$ ) (Fitzgerald et al., 1998). In its original form, this measure contains 10 questions; however, it was modified to exclude two questions not covered by LLW (medication use and blood glucose testing). The revised quiz contained eight multiple-choice questions worth one point each (maximum score = 8).

The preprogram questionnaire also included sociodemographic and diabetes questions, and the postprogram questionnaire included a qualitative program evaluation addressing participants' perceptions of LLW and whether they had made lifestyle changes.

## Data Analysis

We analyzed data using the IBM Statistical Package for Social Sciences (SPSS) for Windows version 24.0. Only data for participants with both preprogram and postprogram questionnaires were included in the analysis ( $n = 76$  out of 120; 63.3% completion rate). We tested the influence on completion rate of sociodemographic variables and preprogram DMSM, DMSE, and knowledge scores using crosstabs with chi-square tests. We used descriptive statistics to summarize sociodemographic data, diabetes status, and the qualitative evaluation responses. Finally, we analyzed preprogram-to-postprogram changes in DMSM practices, DMSE, and knowledge using paired-samples *t*-tests.

## Results and Discussion

### Participants

Primarily, participants were first-generation immigrants (87.5%), females (97.3%), and aged 30–49 (51.6%) and had at least 9–12 years of education (77.8%) (Table 2). Most (84.7%) were from Mexico (Table 2). The majority of those with diabetes reported having been diagnosed for at least 2 years (Table 2).

**Table 2.**

Sociodemographic Characteristics of Latinos Living Well Participants

<b>Participant characteristic (number of participants providing a response)</b>	<b>Number</b>	<b>Percentage</b>
Gender (75)		
Male	2	2.7
Female	73	97.3
Age (66)		
29 years	15	22.7
30–39 years	17	25.8
40–49 years	17	25.8
50–59 years	12	18.2
60-plus years	5	7.6
Education (71)		
8 years	15	21.1
9–12 years	3	43.7
Some college	11	15.5
College graduate	14	19.7
Acculturation (72)		
1st generation (born in country other than U.S.)	63	87.5
2nd generation (born in U.S. with parent from other country)	9	12.5
Country of origin (72)		
Mexico	61	84.7
Central American country	10	13.9
Colombia	1	1.4
Previous diabetes diagnosis		
Gestational diabetes (69)		
Yes	22	31.9
No	39	56.5
Never been pregnant	8	11.6
Prediabetes (69)		
Yes	11	15.9
No	58	84.1
Type 2 diabetes (73)		

Yes	16	21.9
No	57	78.1
Length of time diagnosed with Type 2 diabetes (15) <sup>a</sup>		
1 month	1	6.7
6 months–1 year	2	13.3
Between 1 and 2 years		
2 years	12	80.0

<sup>a</sup>15 out of 16 with Type 2 diabetes responded.

The completion rate was influenced by gender, with only two of 12 males (16.7%) completing LLW compared to 73 of 104 females (70.2%) ( $p = .001$ ). This finding is not surprising, as women are more likely than men to use health care services such as nutrition education (De Melo, de Sa, & Gucciardi, 2013; Thompson et al., 2016). No other sociodemographic differences were detected for any of the outcome measures.

## DMSM, DMSE, and Knowledge Scores and Qualitative Findings

Significant improvements were detected for each outcome measure, and qualitative findings indicated that participants had favorable views of LLW. Specific data are highlighted in the paragraphs that follow; all data are presented in Figure 2 and Table 3 at the end of this subsection.

"General diet" DMSM increased from  $2.64 \pm 2.18$  to  $4.04 \pm 1.51$  ( $p = .001$ ); "specific diet" DMSM increased from  $3.36 \pm 1.59$  to  $4.42 \pm 1.28$  ( $p = .001$ ); and "exercise" DMSM improved from  $2.44 \pm 1.72$  to  $3.02 \pm 1.68$  ( $p = .006$ ) (Figure 2, section a). These changes are promising, as changes in DMSM practices among underrepresented minority groups result in long-term blood glucose control (i.e., hemoglobin A1C) (Ryan, Jennings, Vittoria, & Fedders, 2013). Similarly, Kaiser et al. (2009) found improvements in dietary DMSM following a three-session diabetes intervention among underrepresented minority groups by identifying barriers toward DMSM. Additionally, Archuleta et al. (2012) demonstrated improvements in knowledge and DMSM after a 4-week diabetes intervention with cooking practicums.

The LLW cooking practicums served to introduce participants to healthful, culturally preferred food choices and allowed them to practice food preparation. This program aspect likely empowered participants to choose more healthful food options and prepare more meals that were healthful. This empowerment is also reflected in the qualitative LLW feedback, in which the majority of respondents reported making lifestyle changes during the study (94.5%) and preparing LLW recipes (79.2%) at home (Table 3).

"Exercise" DMSM is likely improved due to the PA breaks that were designed to enhance DMSE and promote discussions of PA benefits and barriers. The LLW PA breaks featured Zumba, a dance-based form of exercise, as dancing helps increase PA in Latinos (Hovell et al., 2008). We chose a publicly available Zumba DVD and Zumba YouTube videos because they indirectly address two common PA barriers reported among Latinos: family responsibilities and limited transportation (D'Alonzo, 2012; Francis, Noterman, & Litchfield, 2014; Parra-Medina & Hilfinger Messias, 2011). The videos could be watched at home (addressing the transportation barrier), and all

family members could participate if desired (addressing the family responsibility barrier). This concept is supported by Marcus et al. (2015), who found that home-based exercise interventions improve PA in Latinas over time. Participants likely increased PA as they became more aware of the associated benefits and the strategies for overcoming identified PA barriers. This idea is supported by the qualitative feedback in which the majority of respondents claimed to be more physically active (81.7%) (Table 3). King et al. (2010) reported that PA sessions during diabetes interventions are effective in translating diabetes knowledge into exercise DMSM.

Additionally, DMSE improved from  $2.43 \pm .65$  to  $2.84 \pm .57$  ( $p = .001$ ) (Figure 2, section b), which is very promising as improved DMSE is correlated with improved blood glucose control (Rosal et al., 2011) and predictive of long-term behavior patterns (e.g., PA) (King et al., 2010). The inclusion of multiple skill-based, hands-on, experiential learning activities likely contributed to these changes (King et al., 2010; Rosal et al., 2011). The LLW activities not only taught the needed skills but also helped empower participants to apply the skills outside the classroom.

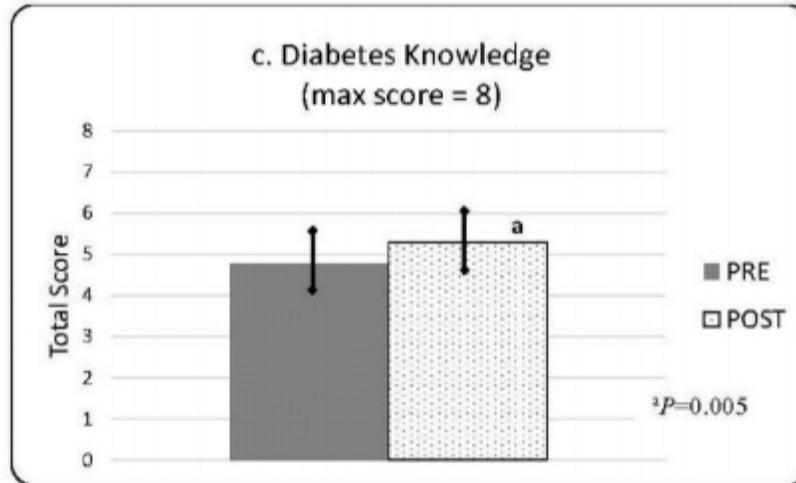
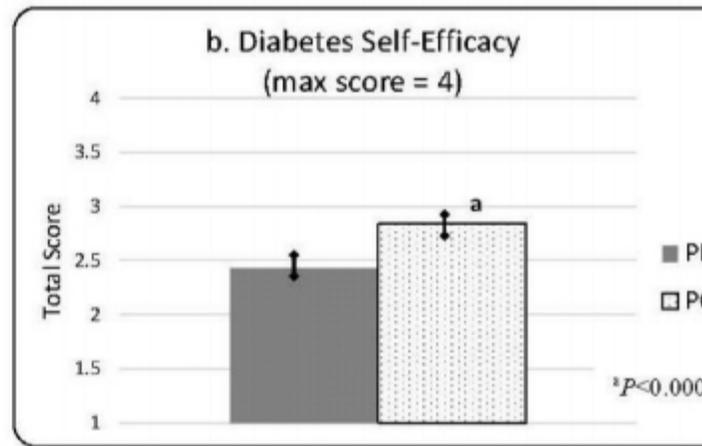
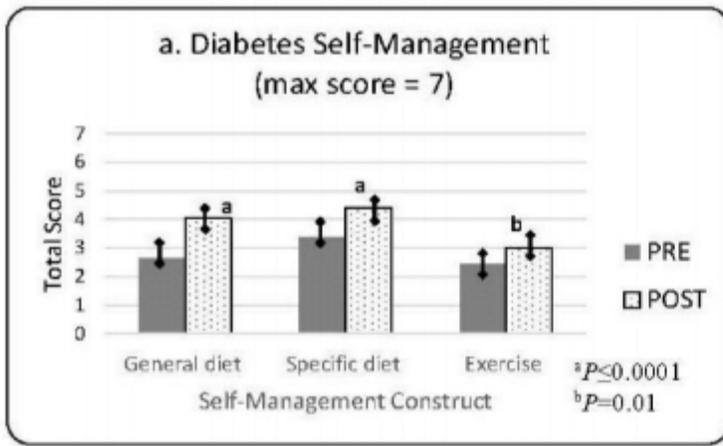
Finally, knowledge increased from  $4.77 \pm 1.52$  to  $5.30 \pm 1.65$  ( $p = .004$ ) (Figure 2, section c), suggesting that LLW promoted understanding of diabetes related to lifestyle management. This finding is supported by the qualitative feedback in which the majority (98.6%) reported finding the information to be "understandable" (Table 3). The inclusion of hands-on activities to enhance skill development may have helped participants understand the "why" behind the recommendations and reinforced the "how to" knowledge needed to result in behavior change. This is important, given the lower education levels of the participants.

Nearly all respondents rated LLW as "good" or "excellent" (95.8%) and would recommend LLW to a friend (94.7%) (Table 3). This receptiveness to LLW is also demonstrated by the favorable completion rate. Using target audience feedback (Francis, Noterman et al., 2014; Reyes, Engebretsen, Ericson, Garcia, & Bagade, 2010) better enabled us to ensure that LLW included preferred programming attributes, addressed topics of need, and was scheduled at convenient times for participants and held at trusted locations.

The impact of LLW on DMSM, DMSE, and knowledge is likely attributable to the inclusion of HBM constructs throughout the curriculum. Our results are similar to other successful HBM-based interventions (Archuleta et al., 2012; McClelland, Jayaratne, & Bird, 2013). Furthermore, participants' receptivity to LLW is likely influenced by the SMT-based curriculum, as is the case with other SMT-based interventions (Francis, MacNab, & Shelley, 2014; Francis, Martin, & Taylor, 2011).

### **Figure 2.**

Diabetes Self-Management, Self-Efficacy, and Knowledge Outcomes



**Table 3.**

Qualitative Outcomes of Latinos Living Well (LLW)

Variable (number of participants providing a response)	Number	Percentage
LLW helped me make healthy lifestyle changes (73)		
Agree	69	94.5
Disagree		
Undecided	4	5.5
Prepared at least one class recipe at home (72)		
Yes	57	78.2
No	15	20.8
Added more physical activity to daily routine (71)		
Yes	58	81.7
No	13	18.3
Overall rating of LLW (73)		
Excellent	55	75.3

Good	15	20.5
Needs Improvement	3	4.1
LLW information was understandable (73)		
Agree	72	98.6
Disagree		
Undecided	1	1.4
Would recommend LLW to a friend (72)		
Agree	72	100
Undecided		
Disagree		

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## Limitations

These results are not generalizable due to our small sample size, sampling methods, and use of self-report data. Although convenience sampling is common practice in Extension, it may have led to the recruitment of Latinos who were more motivated to make behavior changes. The use of self-report surveys was chosen to lessen participant burden during program implementation. However, it presents the possibility for response bias, wherein participants may exaggerate behavior changes to please the program administrators. Lastly, as the participants were primarily females of Mexican descent, the cultural relevance of LLW may be less applicable to men and to those of other Latino cultures.

## Implications and Conclusions

LLW provides Extension an opportunity to offer low-cost research-based diabetes education to rural-residing Latinos. Per our cost analysis, it can be offered to 10 participants for approximately \$1,600 (\$20 weekly per participant). An added benefit is that LLW provides a ready-to-use curriculum complete with training materials, translated scripts, PowerPoint slides, and supplemental materials.

We have found that LLW delivery through Extension is best done via collaborations with Latino-serving community partners. In areas where diabetes education is limited, LLW can be taught collaboratively by a community-based RD or certified diabetes educator (CDE) and the Extension specialist, as is done with DWD. In this delivery model, the RD or CDE leads the diabetes education component while the Extension specialist oversees the cooking and food safety components and cofacilitates the activities. In conclusion, LLW provides the opportunity for Extension to serve the Latino population with culturally appropriate, impactful programming.

## Acknowledgments

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