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Pilot Test of a Culturally Appropriate Diabetes Prevention Intervention for At-Risk Latina Women

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Abstract

Purpose—The purpose of the study was to test the preliminary effectiveness, feasibility, and acceptability of a peer-led, culturally appropriate, Diabetes Prevention Program (DPP)–based lifestyle intervention for Latina women at high-risk for type 2 diabetes (T2DM).

Methods—Participants (N = 61) were overweight/obese (body mass index [BMI] ≥ 25) Latina women with no diabetes, at elevated risk either due to midlife age (45–65 years; n = 37) or history of gestational diabetes mellitus (n = 24). The study used a 1-group pretest-posttest design and offered 12 weeks of peer-led education sessions in a community setting. The intervention targeted physical activity and dietary behaviors to facilitate weight reduction and included culturally appropriate content, age-specific health information, and stress/emotion management strategies. Clinical and self-report assessments were conducted at baseline, month 3, and month 6.

Results—Mean participant age was 47.8 years (SD = 10.8). Most (91.2%) were born in Mexico, and 43.3% had a ninth-grade education or less. At month 6, participants achieved a mean reduction of 4.1% body weight (7 lb [3.2 kg]). Statistically significant improvements were observed for dietary behaviors, stress, and depression symptoms. Attrition was low, 5% (3 women). Focus groups indicated that intervention content increased knowledge, was applicable, highly valued, culturally relevant, and would be recommended to others.

Conclusions—This culturally tailored DPP adaptation was feasible and acceptable for 2 groups of Latina women at high-risk for T2DM and showed preliminary effectiveness in reducing weight and modifying self-reported dietary behaviors, stress, and depression symptoms. Further research is needed to identify ways to enhance weight loss and diabetes prevention in this at-risk, underserved population.

The prevalence of type 2 diabetes mellitus (T2DM) is rising rapidly in the United States and is a leading cause of lost productivity, disability, and death.^{1,2} US Hispanic/Latino adults (hereafter, Latino/a) exhibit elevated diabetes prevalence (16.9%³ compared with 7.6% in non-Latino whites⁴) and have more frequent complications, worse glycemic control,^{4–6} and higher rates of cardiovascular disease (CVD)⁷ once diagnosed. More generally, the elevated risk for cardiometabolic conditions is a significant public health concern among Latino adults; more than 78% are overweight or obese, 22% have high blood pressure, and fewer than 16% meet federal physical activity guidelines.⁷ In the Hispanic Community Health Study/Study of Latinos (HCHS/SOL), a prospective cohort of >16 000 US adults of Latino descent, 80% of men and 71% of women had at least 1 CVD risk factor (smoking, hypercholesterolemia, hypertension, obesity, diabetes); 18.8% of men and 16.1% of women had 3 or more risk factors.⁸

Latina women in midlife (age 45–65 years) and those with a history of gestational diabetes mellitus (GDM) comprise 2 particularly high-risk groups. Weight gain is common in women aged 45 to 65 years because of behavioral and menopause-related hormonal changes that occur with age.⁹ Indeed, most midlife women in the United States are overweight/obese.^{10,11} Adiposity gains in midlife women are typically concentrated in the abdominal region, indicating an accumulation of visceral fat that contributes directly to insulin resistance and risk for T2DM.^{12,13} Women with a history of GDM are at increased risk for future CVD¹⁴ and are 7.5 times more likely than women with a normoglycemic pregnancy to develop T2DM.¹⁵ Latina women are 50% more likely than non-Latina white women to have GDM,¹⁶ have a 50% to 60% risk of developing T2DM within 5 years of a GDM pregnancy,¹⁷ and develop T2DM after GDM at a higher rate than non-Latina white women.¹⁸ Thus, over and above the risks of the general Latino population, these groups of Latina women represent a highly vulnerable cohort with regard to T2DM.

Multiple large randomized clinical trials have shown that intensive lifestyle interventions that provide structured guidance for healthful eating, physical activity, and weight reduction can delay or prevent T2DM in at-risk individuals.^{19,20} Unfortunately, the substantial time (often 16 weeks or longer) and cost burden to both participants and sponsors of these programs is untenable in many health care settings.^{21,22} Low-cost, accessible, and culturally appropriate adaptations of lifestyle-based prevention interventions are needed to effectively reach high-risk Latina women in community settings; however, few adaptations of the Diabetes Prevention Program (DPP) have been tested in US Latinos to date.²³

The current study evaluated the acceptability, feasibility, and preliminary effectiveness of a culturally appropriate, peer educator–led, DPP-based lifestyle intervention program to reduce risk for T2DM and CVD in overweight/ obese Latina women in midlife, aged 45 to 65 years (“Nuestra Vida” [Our Life]), or with history of GDM in the past 5 years (“Dulce Mothers” [Sweet Mothers]). Primary clinical outcomes were weight (pounds) and glucose control (A1C). Self-reported dietary behaviors, physical activity, barriers to health behavior change, and stress and depression symptoms were examined as secondary outcomes. Intervention fidelity was evaluated, and process measures (eg, enrollment rate, attrition) and poststudy focus groups were used to gauge feasibility and satisfaction with the program.

Methods

Study Design

A 1-group pretest-posttest design was used. Participants attended a baseline examination assessing clinical and self-report indicators. Following the baseline examination, participants attended a weekly 2-hour educational lifestyle change class for 12 weeks. Baseline measures were repeated at month 3 (postintervention) and month 6 (follow-up). Between the month 3 and month 6 assessments, monthly maintenance sessions were offered to review intervention materials and increase social support. Written informed consent was provided by all participants, and all study procedures were approved by the Institutional Review Boards of Scripps and San Diego State University.

Participants and Recruitment

Inclusion and Exclusion Criteria—Latina women with body mass index (BMI) ≥ 25 kg/m² were eligible for the study. Exclusion criteria were (1) diagnosis of diabetes or stroke, (2) inability to engage in light to moderate physical activity (eg, because of disability or contraindication from medical provider), and (3) plans to move out of the study region in the upcoming year.

Sample 1, Nuestra Vida—Sample 1 participants were recruited from a randomly selected community cohort of midlife Mexican American women who previously participated in an observational study of sociocultural factors in cardiovascular risk.²⁴ Of the 100 potentially eligible participants identified from that cohort, 22 were not reachable and 78 completed initial phone screening for this study. Of those screened, 10 individuals with T2DM or medical conditions precluding participation were excluded, 19 refused participation, 12 scheduled a baseline visit but failed to attend, and 37 participants ultimately provided informed consent and were enrolled.

Sample 2, Dulce Mothers—Electronic health records (EHRs) at Neighborhood Healthcare, a partnering federally-qualified health center in northern San Diego County that serves predominantly underserved, Latino patients, were queried to identify Latina women aged 18 to 45 years with a history of GDM, delivery within the past 18 to 60 months, and no current diabetes diagnosis. A bilingual research assistant attempted to contact 163 potentially eligible women to evaluate the inclusion/exclusion criteria listed above and to rule out current pregnancy, an additional exclusion criteria in Dulce Mothers. A high number ($n = 113$) could not be reached because of incorrect phone numbers in the EHR or failure to return research assistant calls. Of the 50 women who were successfully reached, 12 individuals with T2DM or medical conditions precluding participation were excluded, 6 declined participation, 8 scheduled a baseline visit but failed to attend, and 24 participants provided informed consent and were enrolled.

Intervention

The pilot intervention was a peer-led cultural adaptation of the original DPP lifestyle curriculum that emphasized health and lifestyle issues relevant to midlife women (Nuestra Vida) and women with a history of GDM (Dulce Mothers). The primary goal of the

intervention was to reduce T2DM risk through weight loss by changing physical activity and dietary behaviors. Group classes were held in community settings and were led by bilingual/bicultural *promotoras* (ie, Latina peer health educators), who received in-depth, standardized training in the intervention protocol. The adaptation retained core elements of the DPP curriculum (ie, education on diabetes risk, healthy eating and physical activity, self-monitoring, goal setting) and added educational content specific to midlife (eg, weight gain, menopause/hormonal changes; Nuestra Vida) or motherhood (eg, breast-feeding, family health; Dulce Mothers), covered Latino cultural elements (eg, foods, ethnicity-related risk factors, cultural beliefs), and emphasized skills for coping with stress and negative emotions and inclusion of peers and family into lifestyle changes. In alignment with social cognitive theory²⁵ and self-determination theory,²⁶ the curriculum targeted cultivation of internal and social resources (eg, self-efficacy, social support), social modeling of healthy behaviors, autonomous decision making, enjoyment and “fun” as motivators, and optimizing warmth and social support among participants. Thus, multiple modules involved experiential learning through the use of portion size modeling, cooking demonstrations, and group exercise (eg, walking, high-energy dance). The curriculum was offered in Spanish (via expert forward- and back-translation) and English, per participant preference. Experienced Latina promotoras reviewed and provided feedback on all elements of the adapted curriculum prior to implementation to increase acceptability, feasibility, and relevance.

Measures

Clinical Indicators—Height and weight were measured via a standardized protocol using a stadiometer and medical-grade digital scale. BMI was calculated as weight in kilograms/height in meters squared. Waist circumference was measured on a parallel plane at the level of the navel using a flexible measuring tape. A1C was measured by a bilingual certified nurse via finger-stick blood draw and point-of-care rapid immunoanalysis using the Food and Drugs Administration–and National Glycohemoglobin Standardization Program–approved Siemens DCA Vantage Analyzer, which provides an A1C percentage in 6 minutes with interassay imprecision <3%. Blood pressure was assessed using an automated oscillometric device (Omron HEM 907XL) using a standardized protocol. Systolic (SBP) and diastolic (DBP) blood pressure readings were taken 3 times at 5-minute intervals after the participant had rested 5 minutes in a seated position; the average of the second and third measurements was used to represent SBP and DBP in analyses.

Self-report Measures—Participants completed self-report measures of sociodemographic and health variables, including age, education, household income, marital status, country of birth, number of years living in the United States, health insurance status, overall self-rated health (from poor to excellent), and language of interview (English or Spanish). Physical activity was assessed using the 9-item Rapid Assessment of Physical Activity, a brief measure of engagement in light, moderate, and vigorous physical activity as well as stretching and flexibility exercises. Dietary behaviors were assessed via a modified version of the University of California Cooperative Extension Food Behavior Checklist,²⁷ which provides information on frequency of consumption of various food and beverage categories (eg, fruits, vegetables, grains, sodas) and food behaviors (eg, reading food labels, measuring portion size). Depression symptoms were assessed using the 8-item Patient Health

Questionnaire,²⁸ a brief screening measure of depression symptoms over the previous 2 weeks, which has been shown to be valid and reliable in Spanish- and English-speaking populations in previous studies. Barriers to physical activity and healthy eating were assessed with the 9-item exercise barriers measure from the Healthy and Retirement Study (<http://hrsonline.isr.umich.edu>) and a modification of the 12-item healthy diet barriers subscale of the Dietary Sodium Restriction Questionnaire.²⁹ Scores from both measures were combined into 1 total sum score, with higher scores indicating more perceived barriers. Perceived stress was assessed using the 10-item Perceived Stress Scale (PSS),³⁰ which measures frequency of stress responses (eg, nervousness/stress, feeling overwhelmed) in the past month. The PSS has also demonstrated validity and reliability in both languages.

Process Measures—A multimethod intervention fidelity evaluation was conducted to monitor curriculum delivery. Specifically, participants and promotoras completed postsession intervention checklists rating coverage of planned content, and independent raters reviewed audio recordings of sessions and documented the percentage of scheduled content addressed. An overall percentage rating of intervention fidelity from 0% (no content covered as planned) to 100% (all content presented as planned) was generated across raters for each intervention cohort. Cohort fidelity percentages were averaged to depict average fidelity percentage scores for each subsample. Enrollment, attendance, and attrition rates were collected to evaluate acceptability and feasibility of the intervention. Poststudy focus groups and participant-reported reasons for discontinuing the program provided qualitative data regarding feasibility and overall satisfaction.

Statistical Analysis

Descriptive analyses were conducted in IBM SPSS Statistics 23 (IBM Corporation, Armonk, NY). Multilevel modeling (MLM) analyses with full maximum likelihood estimation conducted in HLM7 (Scientific Software International, Lincolnwood, IL) were used to examine changes in clinical and self-report (behavioral and psychosocial) indicators over time in the overall sample. MLM accounted for the nested structure of the data (ie, repeated measures within individuals) and allowed for missing data and differences in time between assessment visits. Using the full maximum likelihood procedure, model parameters were estimated using all available data from both complete and partial cases. This recommended approach for handling missing data has been shown to produce unbiased parameter estimates and standard errors in varied missing data situations.³¹ Initial models that included a group (Nuestra Vida; Dulce Mothers) by time interaction effect revealed no significant interaction for any outcome. Thus, the groups were combined, and interaction effects were dropped for parsimony.

Results

Baseline characteristics for the overall sample ($N = 61$) and the Nuestra Vida ($n = 37$) and Dulce Mothers ($n = 24$) subsamples are presented in Table 1. Participants ranged in age from 30 to 66 years (mean = 47.8; SD = 10.8). Most were born in Mexico (91.2%) and had health insurance (65.6%). In comparison with Dulce Mothers participants, Nuestra Vida participants were significantly older ($P < .001$), had higher annual household incomes ($P < .$

05), and were less likely to be married or living with a partner ($P < .001$). There were no statistically significant differences between samples on any other demographic characteristics or clinical indicators (P 's $> .05$) with the exception of SBP; Nuestra Vida participants had significantly higher SBP at baseline than Dulce Mothers participants (123.4 mm Hg versus 109.8 mm Hg; $P < .01$).

Clinical Indicators

Table 2 presents overall and subsample means at baseline, month 3, and month 6 for each clinical outcome. Between baseline and month 6, the overall sample achieved a 7-lb (32-kg) or 4.1% mean reduction in body weight. A subanalysis of $n = 37$ women who completed both the baseline and month 6 assessments indicated that approximately 1 in 5 women (21.6%) achieved the targeted 5% weight loss goal; $n = 2$ participants (15.4%) from Dulce Mothers and $n = 6$ (25.0%) from Nuestra Vida. In multilevel models adjusted for age, education, and income, the small-to-moderate effect size for mean weight change ($d = 0.29$) did not reach statistical significance ($P = .28$). No statistically significant improvements were observed for any other clinical indicator (P 's $> .05$).

Self-report Measures

Descriptive statistics for behavioral and psychosocial variables are presented in Table 3. Statistically significant improvements were observed for dietary behaviors, perceived stress, and depression symptoms (P 's $< .05$); trends toward improvement were observed for physical activity (PA) and barriers to PA and healthful eating (P 's $< .10$).

Process Evaluations

A multimethod evaluation of intervention fidelity indicated adequate coverage of curriculum content as rated by participants ($M = 3.91$ out of a possible 4, $SD = 0.12$), promotoras ($M = 3.34$ out of a possible 4, $SD = 0.36$), and independent raters ($M = 86.60\%$ out of a possible 100%, $SD = 7.64\%$). Of 106 eligible women, 61 participants enrolled, for an enrollment rate of 58%. Three women (5%) dropped out of the program after enrollment. Reasons for attrition included physician recommendation to stop PA ($n = 1$), work-related schedule conflict ($n = 1$), and general time constraints ($n = 1$). On average, participants attended 8.02 ($SD = 3.33$) of 12 classes. Seventy-two percent of participants completed at least 6 classes, and 11.5% attended all 12. The attendance rate was slightly higher in Nuestra Vida ($M = 8.46$, $SD = 3.35$) than in Dulce Mothers ($M = 7.33$, $SD = 3.25$); however, this difference was not statistically significant ($P = .20$). In poststudy focus groups designed to qualitatively evaluate feasibility and overall satisfaction with the program, participants reported that the curriculum content was new and useful, culturally relevant, and increased their understanding of how to help themselves and family members prevent diabetes. Participants appreciated the convenient community location, provision of childcare (Dulce Mothers), and social support received from other participants and the promotoras. When asked for ways to enhance the intervention, women requested additional content on nutrition/dietary change (eg, examples of balanced meals; healthful recipes/cookbooks), physical activity and weight loss, stress, and menopause/aging-related topics (Nuestra Vida). Many women reported that they found the dietary and weight reduction information and stress management skills to be among the most helpful topics discussed.

Discussion

Of the few culturally tailored diabetes prevention interventions that have targeted US Latino communities to date, most have resulted in high attrition and small effect sizes (eg, $d = 0.01$ – 0.33) for changes in weight.²³ This community-based, peer-led, culturally tailored adaptation of the DPP lifestyle change curriculum for Latina women demonstrated strong feasibility and acceptability, low attrition, and led to average weight reduction of a small-to-moderate effect size ($d = 0.29$) despite not achieving statistical significance. Similar to other small pilot trials,²³ this trial did not result in significant changes in clinical indicators (glucose regulation, waist circumference, blood pressure) over 6 months. However, the statistically significant improvements in dietary behaviors, perceived stress, and depression symptoms and trends toward improvement in physical activity and barriers to healthy eating indicate preliminary effectiveness in influencing the behaviors most critical to cardiometabolic risk.

While only 22% of the women in this trial achieved the 5% weight loss goal, the group mean weight reduction of 7 lb (3.2 kg) is greater than all but 1 prior culturally tailored community intervention for Latinos,³² based on a 2017 systematic review,²³ and higher than the mean effect across all 22 community-based translational DPPs conducted in all populations prior to a 2014 meta-analysis.³³ Given that each 2.2 lb (1 kg) of weight loss is associated with a 16% reduction in future diabetes incidence,³⁴ the weight loss achieved in this trial has marked clinical significance. Importantly, as the primary goal was to assess intervention acceptability and feasibility, this small pilot trial was not powered to detect significant changes in clinical outcomes. As such, all statistically significant findings in this small sample indicate potential efficacy when repeated in a powered trial.

To address problems of poor sustainability, high participant burden, and high attrition in prior community adaptations of the DPP, this pilot curriculum consolidated core elements of the DPP into 12 sessions (25% time reduction). Didactic content was carefully tailored to participants' age, gender, language, culture, and socioeconomic status, using local promotora expertise and feedback throughout the adaptation process. Problem solving, support building, and stress/emotion coping skills were emphasized to increase participant self-efficacy, satisfaction, and retention, with the goal of improved behavioral and clinical outcomes for Latina women compared with existing interventions. In the present study, trained promotoras successfully delivered the tailored content with acceptable/good fidelity. Notably, participants reported high levels of satisfaction with the Nuestra Vida and Dulce Mothers programs during poststudy focus groups.

Strengths of this intervention include the focus on 2 particularly at-risk groups of Latina women and in-depth, multicomponent tailoring process that included all aspects of cultural tailoring associated with previously effective diabetes prevention trials for Latinos²³: structured community input in development, promotora delivery, discussion of Latino foods/recipes and cultural diabetes beliefs, promotion of family/friend participation in home practice, and ecologically valid group activities (eg, walking groups in participants' neighborhood). In addition, a community-based participatory approach guided intervention development, and both quantitative and qualitative methods were used to evaluate feasibility

and acceptability. Limitations include a small sample size and resultant statistical power limitations, lack of a control group, less than optimal attendance rates, self-report versus objective indicators of health behaviors, and a brief follow-up period.

Implications

Results from this intervention suggest several implications for future studies and diabetes educators. First, larger, randomized controlled trials, with adequate power to detect clinically significant changes in weight, glucose regulation, and behavior, are needed to evaluate culturally tailored prevention interventions in understudied, at-risk populations. Programs that aim to increase the percentage of participants achieving 5% weight loss among Latina women should consider an earlier start to the intervention window (eg, beginning nutrition education or weight management during GDM pregnancies when women are highly motivated toward health behavior changes or earlier in the midlife continuum before weight gain increases). Reaching participants proved difficult in Dulce Mothers, highlighting barriers for preventive care related to demanding maternal schedules postdelivery. Future studies could consider beginning recruitment and intervention prior to delivery when motivation to engage in health care is high. Studies could also consider a mobile health component (eg, smart phone app or text messaging) to increase contact with intervention materials between group meetings or as an alternative to in-person sessions for those who face barriers to attendance. Requests for additional nutrition content in the postintervention feedback focus groups indicates that at-risk Latina women may benefit from intensive and creative approaches to nutrition education. In addition to prior suggestions, experiential exercises such as in-person meal preparation, grocery shopping, food substitution practice, and navigating unhealthy food at social events may improve learning of nutrition concepts and enhance dietary behavior change.

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Table 1

Sample Characteristics

	Nuestra Vida (n = 37), n (%)	Dulce Mothers (n = 24), n (%)	Combined (N = 61), n (%)
Marital status ***			
Married/living with a partner	21 (56.8)	23 (95.8)	44 (76.3)
Not married/living with a partner	16 (43.2)	1 (4.2)	17 (23.7)
Country of origin			
Mexico	32 (86.5)	23 (95.8)	55 (91.2)
United States	5 (13.5)	0 (0)	5 (6.8)
Other	0 (0)	1 (4.2)	1 (2.1)
Education			
Less than ninth grade	12 (32.4)	13 (54.2)	25 (43.3)
Ninth grade or more	25 (67.6)	11 (45.8)	26 (56.7)
Insurance coverage			
Insured	27 (73.0)	13 (54.2)	40 (65.6)
Uninsured	5 (13.5)	6 (25.0)	11 (18.0)
Declined to report	5 (13.5)	5 (20.8)	10 (16.4)
Annual household income *			
<\$10 000	2 (5.4)	3 (12.5)	5 (8.2)
\$10 001 to \$25 000	9 (24.3)	8 (33.3)	17 (27.9)
\$25 001 to \$50 000	16 (43.3)	9 (37.5)	25 (40.9)
\$50 001 to \$75 000	6 (16.2)	1 (4.2)	7 (11.5)
>\$75 000	4 (10.8)	0 (0)	4 (6.6)
Declined to report	0 (0.0)	3 (12.5)	3 (4.9)
	M (SD)	M (SD)	M (SD)
Age in years, mean (SD) ***	55.9 (4.9)	35.9 (3.6)	47.8 (10.8)
Weight, lb	170.9 (24.6)	166.9 (27.9)	169.4 (25.8)
BMI, kg/m ²	31.6 (4.4)	31.6 (4.5)	31.6 (4.4)
Waist, in.	40.8 (4.3)	42.1 (3.7)	41.3 (4.1)
A1C (%) [mmol/mol]	5.6 (0.3) [38]	5.7 (0.3) [39]	5.66 (0.3) [39]
SBP, mm Hg **	123.4(15.1)	109.8 (13.6)	118.1 (15.9)
DBP, mm Hg	73.4 (7.9)	69.5 (11.1)	71.8 (9.4)

Abbreviations: BMI, body mass index; DBP, diastolic blood pressure; SBP, systolic blood pressure.

* $P < .05$,

** $P < .01$,

*** $P < .001$.

P values were derived from independent-sample t tests or χ^2 tests comparing Nuestra Vida and Dulce Mothers samples.

Table 2

Clinical Outcomes for Nuestra Vida, Dulce Mothers, and Combined Samples at Baseline, Month 3, and Month 6^a

	Nuestra Vida, Mean (SD)				Dulce Mothers, Mean (SD)				Combined, Mean (SD)				P Value ^b
	BL (n = 37)	M3 (n = 29)	M6 (n = 24)		BL (n = 24)	M3 (n = 14)	M6 (n = 13)		BL (n = 61)	M3 (n = 43)	M6 (n = 37)		
Weight, lb	170.9 (24.6)	164.9 (21.0)	165.5 (22.8)		166.9 (27.9)	157.3 (24.8)	157.9 (26.8)		169.4 (25.8)	162.4 (22.2)	162.8 (24.2)		.28
BMI, kg/m ²	31.6 (4.4)	30.7 (3.7)	30.7 (4.0)		31.6 (4.5)	30.1 (3.3)	30.3 (3.6)		31.6 (4.4)	30.5 (3.6)	30.5 (3.9)		.27
Waist, in.	40.8 (4.3)	38.9 (4.1)	38.7 (4.0)		42.1 (3.7)	40.8 (3.5)	41.2 (3.8)		41.3 (4.1)	39.6 (4.0)	39.4 (4.1)		.37
A1C (%) [mmol/mol]	5.6 (0.3) [38]	5.7 (0.3) [39]	5.6 (0.3) [38]		5.7 (0.3) [39]	5.7 (0.3) [39]	5.7 (0.2) [39]		5.66 (0.3) [38]	5.70 (0.3) [39]	5.63 (0.27) [38]		.67
SBP, mm Hg	123.4 (15.1)	123.8 (15.3)	123.7 (13.0)		109.8 (13.6)	111.6 (16.6)	109.2 (12.1)		118.1 (15.9)	119.8 (16.6)	118.6 (14.4)		.69
DBP, mm Hg	73.4 (7.9)	72.1 (7.5)	74.2 (7.7)		69.5 (11.1)	71.3 (11.3)	67.9 (11.4)		71.8 (9.4)	71.8 (8.7)	72.0 (9.5)		.67

Abbreviations: BL, baseline; BMI, body mass index; DBP, diastolic blood pressure; M3, month 3; M6, month 6; SBP, systolic blood pressure.

^a n's vary across time points because of missing data.

^b P-values represent the significance level for the main effect (time) and are derived from multilevel models that controlled for age, education, and income in the combined sample.

Table 3

Behavioral and Psychosocial Outcomes for Dulce Mothers, Nuestra Vida, and Combined Samples at Baseline, Month 3, and Month 6^a

	Nuestra Vida, Mean (SD)				Dulce Mothers, Mean (SD)				Combined, Mean (SD)				P Value ^b
	BL (n = 37)	M3 (n = 29)	M6 (n = 24)		BL (n = 24)	M3 (n = 14)	M6 (n = 13)		BL (n = 61)	M3 (n = 43)	M6 (n = 37)		
Diet													
Healthful eating	46.8 (6.3)	52.8 (5.4)	52.6 (5.3)		44.7 (6.7)	49.9 (8.2)	49.0 (7.4)		46.0 (6.5)	51.9 (6.3)	51.3 (6.3)		.03
Barriers	3.4 (2.4)	2.3 (2.0)	1.9 (1.6)		4.2 (2.2)	3.6 (2.3)	3.3 (1.9)		3.7 (2.4)	2.7 (2.2)	2.4 (1.8)		.09
Physical activity													
Aerobic	4.6 (2.0)	5.5 (2.4)	6.1 (1.6)		4.2 (1.8)	6.2 (1.0)	5.1 (1.7)		4.4 (1.9)	5.7 (2.1)	5.7 (1.7)		.08
Strength/flexibility	0.4 (0.9)	1.7 (1.2)	1.9 (1.3)		0.4 (0.8)	0.6 (1.0)	1.1 (1.3)		0.4 (0.8)	1.3 (1.2)	1.6 (1.3)		.10
Barriers	1.7 (1.4)	0.7 (1.3)	0.8 (0.8)		2.3 (1.8)	1.1 (1.4)	1.7 (1.8)		1.9 (1.7)	0.8 (1.3)	1.1 (1.3)		.29
Stress	24.5 (6.4)	23.8 (7.3)	21.6 (6.0)		25.0 (4.3)	23.0 (5.9)	20.6 (4.3)		24.6 (5.6)	23.6 (6.8)	21.2 (5.5)		.01
Perceived health	2.8 (0.6)	2.6 (0.8)	2.6 (0.6)		2.7 (0.9)	2.7 (0.9)	2.6 (0.8)		2.8 (0.8)	2.6 (0.8)	2.6 (0.7)		.68
Depression	4.8 (3.9)	2.7 (3.6)	2.6 (2.6)		3.5 (3.2)	1.5 (2.5)	1.7 (2.0)		4.2 (3.7)	2.3 (3.3)	2.3 (2.4)		.02

Abbreviations: BL, baseline; DBP, diastolic blood pressure; M3, month 3; M6, month 6.

^a n's vary across time points because of missing data.

^b P-values represent the significance level for the main effect (time) and are derived from multilevel models that controlled for age, education, and income in the combined sample.