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Description of an Academic-Community Partnership Lifestyle Program for Lower-Income, Minority Adults at Risk for Diabetes

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Abstract

Purpose—Translating strategies and approaches from the successful clinically-based Diabetes Prevention Program's lifestyle intervention to community settings is a key next step. This article describes a lifestyle program developed in partnership by researchers at a major university and public health professionals at a local health department.

Methods—The *Live Well, Be Well (LWBW)* program was designed to meet the needs of lower-income, minority, and low-literacy adults at risk for diabetes. It was adapted from interventions with demonstrated efficacy and delivered in Spanish and English by health department staff. The program consisted of a 6-month active phase and a 6-month maintenance phase and was primarily telephone-based, with one in-person planning session and several group workshops. In-person and group sessions were held in convenient community-based settings. Counselors provided education and skills training to modify diet and increase physical activity. Self-selected and attainable goal-setting and action plans were emphasized to enhance self-efficacy. *LWBW* is the intervention component of a randomized trial with primary outcomes of fasting glucose, weight, and other clinical measures.

Conclusions—The program provides a unique translational model for implementing diabetes risk reduction programs for underserved populations. Individually-tailored and non-prescriptive, it utilized existing health department infrastructure, focused on telephone counseling, used culturally-appropriate, low-literacy materials, and was delivered in local, community-based facilities.

Keywords

Translational research; lifestyle intervention; minority populations; academic-community partnership

The Diabetes Prevention Program (DPP) found that type 2 diabetes can be prevented through intensive lifestyle modification, including increased physical activity, weight loss, and dietary changes. Translating this knowledge into programs provided in real-world settings is challenging. To reach populations that are most at risk for diabetes, programs that are locally based, inclusive, culturally appropriate, and sustainable must be created and evaluated.

The purpose of this article is to describe a community-based, lifestyle, diabetes risk-reduction program - *Live Well, Be Well (LWBW)* - delivered by staff at a public health department. *LWBW* was designed for adults from lower-income, minority communities, as this population has a higher prevalence of type 2 diabetes and its risk factors than its counterparts. The project aimed to translate knowledge that lifestyle changes can reduce risk of type 2 diabetes into a lifestyle program that is feasible for this setting and population. The program is described including its theoretical basis, program components, behavior change strategies, and translational qualities. *LWBW* is the intervention component of a randomized controlled trial with primary outcomes of fasting glucose, weight, and other clinical measures. Analysis of the effectiveness of the trial is in progress.

Background

Rationale - Translating Existing Lifestyle Program Models

Translational research applies knowledge from clinical research to real world environments.³ For type 2 diabetes prevention, the DPP provided an intensive clinically-prescribed lifestyle program focused on changing participants' diet and physical activity using a goal-based strategy (achieve and maintain at least a 7% loss of body weight and at least 150 min/week of moderate intensity exercise).⁴ The DPP oversampled ethnic minority groups and found that the lifestyle intervention reduced the incidence of diabetes by 58% relative to a control group, irrespective of race or ethnic group.¹ However, it was conducted in a healthcare setting and was cost intensive.

Public health departments are ideal settings for delivering lifestyle programs because they are engaged in chronic disease prevention, have connections to community agencies, and serve vulnerable populations most at risk of chronic disease. Thus, LWBW was a collaborative project between the University of California, San Francisco (UCSF) and the City of Berkeley Public Health Department (BPHD). Within this partnership, BPHD staff delivered LWBW (the intervention) and UCSF conducted a randomized trial evaluating the intervention.

At the time *LWBW* was being designed (2005-2007), there were very few examples of translations of the DPP into community settings, although several have been published since then.⁵⁻⁷ Epidemiologists, clinical trialists, nutritionists, exercise physiologists, and social workers provided input on the formulation of the program.

In designing LWBW, recommendations for translating diabetes prevention studies were applied^{8, 9} as well as knowledge gained from the DPP and other types of lifestyle interventions including those of the investigators. The general telephone-based approach was based on the investigators' experience with CHAMPS - the Community Healthy Activities Model Program for Seniors - which was an "individually adapted behavior change program"¹⁰ as well as the experiences of health department staff in delivering Active Choices, part of the Robert Wood Johnson Foundation Active for Life project. 11 CHAMPS II was a choice-based physical activity promotion program to increase the "lifestyle" physical activity of older adults through information, support, problem solving, and skills training. 12 CHAMPS III diffused the program into community settings serving minority and lower-income populations. ¹³ Our goal was to use existing lifestyle program resources when possible. Thus, resources from professional organizations (e.g., American Diabetes Association), government (e.g., U.S. Department of Health and Human Services, Centers for Disease Control and Prevention), the DPP lifestyle program, 4 and other institutions were considered during the planning process. There were fewer low-literacy sources of Spanishlanguage materials, thus English language materials were sometimes translated and adapted. Occasionally, Spanish language materials¹⁴ were translated into English. Last, formative research aided in developing culturally and ethnically sensitive materials, including new focus groups and our prior work exploring issues in bringing lifestyle programs to underserved communities. ¹⁵ Thus, LWBW benefited from numerous sources in creating specific content and materials.

Methods

Participants

Individuals were eligible if they lived or worked within the health department's service area, were at least 25 years of age, had no serious medical conditions, and were at risk of type 2 diabetes. Based on the population demographics of the health department service area, the priority was on reaching African American, Asian, and Latino adults including monolingual Spanish speakers. Diabetes risk screening was done through community-wide diabetes education and risk assessment. Screening for risk was based on a self-report diabetes risk appraisal and a fasting fingerstick test. Study recruitment began after individuals at risk were identified. Details on screening and recruitment are provided elsewhere. ¹⁶

A total of 119 participants randomized to the intervention arm of the trial received the 1-year program (119 were randomized to a wait-list control group that was offered the program at the end of one year). Recruitment was conducted over a 2-year period, thus in any month, each counselor had a caseload of about 8-10 participants.

Program Description

Integrating all of the resources described above, *LWBW* was choice based and individually-tailored. The program provided education, skills, and support according to participants' preferences and readiness for change. Each participant was assigned an individual counselor who provided a sense of partnership and support throughout the program. Counselors learned participants' strengths, expectations, and barriers. For participants, the counselor provided a trusted source of support, a person to whom they reported their progress, and who held them accountable for their goals. The continuity of the relationship and the individually-tailored focus allowed participants to start where they were on the continuum of change, select their own lifestyle goals, decide how to achieve them, and attempt sustainable changes.

Theoretical basis and core behavior change themes—The guiding frameworks were the Health Belief Model, Social Cognitive Theory, and the Transtheoretical Model. The Health Belief Model¹⁷ was applied by providing information about participants' individual susceptibility through diabetes risk assessment and by tailoring information on how to lower individual risk. Self-monitoring, goal-setting, and problem-solving - two key Social Cognitive Theory concepts¹⁸ - were taught to provide behavior change skills and increase self-efficacy. The Transtheoretical Model¹⁹ was applied when telephone counselors assessed participants' stage of change and varied their approach to suit participants' readiness to change.

To achieve the program goals of reducing fasting plasma glucose and improving clinical risk factors, *LWBW* emphasized increasing physical activity and improving eating habits, two modifiable behaviors most likely to reduce risk. Four core behavioral themes provided easily remembered "phrases:" *Get Active, Eat Smart, Eat your Colors*, and *Eat Breakfast.* Table 1 summarizes these themes including the respective education and skill building offered, and examples of specific behavior changes. Multiple sources for the components were used, thus examples of the sources are cited.

Get Active promoted 30 minutes of moderate-intensity physical activity at least five days a week (150 min/week). This goal, also set by the DPP, ⁴ appears to be sufficient to improve weight, glucose, and insulin sensitivity. ²⁰ *LWBW* emphasized walking as practical, low cost, and accessible. Participants were encouraged to increase activities of all intensities based on evidence of their benefit. ²¹

The dietary change themes were those found to reduce diabetes risk: reducing caloric intake and total fat, and increasing fiber (fruits, vegetables, and whole grains). ^{22, 23} Eat Smart included strategies to reduce caloric intake through alternative food choices (e.g., lower-fat versions, substituting lower-calorie beverages), and eating strategies (e.g., smaller plates). Eat your Colors promoted fruit and vegetable consumption (providing lower calorie and low fat alternatives), and increased fiber consumption. ²⁴ LWBW emphasized "colors" to reflect the importance of variety and of stronger colored fruits and vegetables. Eat Breakfast provided several pathways to reduce risk. A healthy low-fat breakfast can provide energy and regulate metabolism, is key to weight management, and may reduce total caloric intake. ²⁵

Behavioral Change Strategies—Consistent with principles of individually tailored behavior change programs, education, skills building, and motivational interviewing were key strategies to encourage behavior changes.

Education: Education about the health risks and benefits of healthy behaviors created the precondition for behavior change. Because diabetes education and risk assessment were part of recruitment, participants began the program with information about diabetes (e.g., diabetes is preventable) and their individual risk factors.

The program's educational materials and messages were designed to be appropriate for all of our race/ethnic groups. ^{26, 27} Low-literacy materials can improve knowledge among readers of all literacy levels. ²⁸ Thus all delivery components employed a simple format designed to appeal to people of all literacy levels. Written materials included interactive tools when appropriate. Counselors used an educational format where they assessed what participants knew about the topic being discussed, provided new information, and allowed time for participants to restate the main concepts in their own words. ^{29, 30}

Skills Building: Through skills training in goal setting, self-monitoring, structured problem-solving, and relapse prevention, participants tackled behavior changes that could be sustained. During the personal planning session, participants learned to break down long-term goals and create short-term "action plans" that were specific, measurable, immediate, and attainable. Goals and action plans were chosen by participants with counselor guidance, taking into account participants' strengths, resources, and barriers. Counselors asked participants to rate each goal or action plan using a 0 to 10 "confidence scale." Participants with low confidence were encouraged to choose a more achievable plan to increase the likelihood of experiencing mastery. Self-monitoring techniques were presented including how to use a pedometer and food diary and how to read food labels and reduce portion sizes. Participants learned how to shop for and prepare healthy meals through workshops and other materials on food labels, portion sizes and alternatives to high sugar/fat foods.

Motivational Interviewing Strategies: Motivational interviewing techniques that developed and enhanced the participants' own motivation were employed primarily during the telephone calls. Using open-ended questions, *LWBW* counselors assessed participants' readiness (e.g., not thinking about change, preparing to make changes). Open-ended questions encouraged discussion of the "pros and cons" of change, finding solutions to barriers, and envisioning gains resulting from changes. Counselors encouraged ownership of the change process, reinforced self-motivating ideas (e.g., "I would like to be a role model for my family"), and helped participants acknowledge and work through ambivalence. This individually-tailored process allowed participants to make changes at their own pace and to move forward when they were more confident of success.³³

Program components—The program included a 6-month active intervention phase and a 6-month maintenance phase. Most counselor-participant contact occurred at the beginning, gradually decreasing over the program period. Program components included an introductory session, a program binder, a personal planning session, telephone calls, workshops, and newsletters. The objectives, content, hours of contact, and timing of each program component are described in Table 2. The program was free of charge, with a total of approximately 18 hours of contact (phone or in-person) offered to each participant. All inperson components were offered in local venues, as the importance of program proximity was a central finding in formative research.

Below, some distinctive characteristics of each component are highlighted. The final website with all program materials available for free is: http://iha.ucsf.edu/LiveWellBeWell/.

Introductory Session: "Get Ready, Get Set, Prevent Diabetes." This was an orientation and educational session. Building on participants' existent diabetes knowledge, experiences, values, and beliefs, diabetes prevention education emphasized mutable risk factors. The four core themes were discussed - Get Active, Eat Smart, Eat your Colors, and Eat Breakfast - to get participants to reflect on their current eating and physical activity habits and elicit their ideas of how they could improve their lifestyle. In this session participants were given a pedometer, a food diary, and a physical activity calendar and asked to track what they ate and the number of daily steps they took for one week. Goal setting was introduced, along with the concept of action plans, i.e., the importance of taking several small steps to reach a larger goal.

Program Binder: The program binder, provided at the Introductory Session, was designed to be referred to during workshops and telephone calls and to be used independently without guidance from counselors. It included illustrations of people, food, and activities appropriate to the priority populations, and was developed for lower-literacy individuals and written at

approximately a 5th grade reading level. Six sections emphasized modifiable risk factors and used interactive elements (e.g., page cut-outs with nutritional information to take to the grocery store) to support skills building.

Personal Planning Session: This one-on-one meeting between the counselor and participant one week after the introductory session enabled counselors to start building a partnership with the participant. Counselors asked non-judgmental, open-ended questions related to participants' food intake and physical activity, referring to the food diary and pedometer if participants had used them. Participants were asked about their own agenda for the program, and the things in their lives they might improve if they were able to fulfill this agenda. They were asked to anticipate and come up with their own solutions to any barriers they might face. Action plans were described again, noting that they needed to be realistic, specific, written, and constantly revised. Participants were encouraged to tackle one behavior change at a time. Counselors scheduled the first call, at the participants' convenience, preferably within one week.

Telephone Calls: A main objective of the calls was to engage participants in the change process, foster a sense of ownership in their individualized program, and help them set an agenda to help achieve their long-term goal. If appropriate, counselors reviewed participants' action plan. Participants who accomplished their action plan were encouraged to reward themselves with nonmonetary meaningful rewards. For those who did not, the counselor and participant assessed how realistic it was and what obstacles got in the way. Together they sorted out ambivalence, problem solved, and assessed motivation, readiness and confidence to try again or set a more achievable goal that was specific and related to participants' own intrinsic motivation. Participants also were encouraged to utilize their social support, i.e., find somebody to exercise with, share successes, and obtain support when action plans were challenging.

Workshops: The program workshops were led by a multiethnic health department staff, including but not limited to the telephone counselors. Workshops applied culturally appropriate didactic and interactive skill building techniques. For example, to increase confidence in choosing healthy foods when shopping, a table was set up with numerous culturally diverse food labels and participants were asked to choose a healthy and non-healthy option; a discussion ensued about the choices. A demonstration showed the amount of teaspoons of fat contained in some popular foods and the amount of sugar in a regular soda. For the Spanish workshop, food labels were translated and explained before proceeding to label reading, and Mexican sodas were used for the sugar demonstration.

Staff Qualifications, Training, and Caseload

Program counselors included a community health telephone counselor, registered public health nurse, and health educator (the latter two were bilingual Latinas). All of them were part-time counselors, for a total of about one Full Time Equivalent (FTE). This was possible because of the relatively small number of participants in the program in any month as noted above. Additional program staff assisted in delivery of group workshops, including graduate-level health educators and a community outreach worker. The counselors and program staff had varying types of expertise and experience. All counselors and program staff worked on the program part-time, fitting it into other ongoing duties. This reflects the "real-world" strategy taken by the health department to utilize existing staff, making it more feasible and sustainable.

All counselors and program staff received training in diabetes and its prevention, motivational interviewing and behavior change techniques, program content and delivery,

and the logistics of managing a caseload. The 2-session training on motivational interviewing and behavior change techniques was provided by an experienced, licensed social worker. Monthly case conferences supervised by the social worker allowed counselors to discuss their cases, receive feedback from the group, and continue building skills through information and updates on motivational interviewing. Individual supervision of the telephone counseling was also available. Ongoing training on program management, content, and delivery used a three-step system (observing, partnering, and leading under observation), and paired less- and more-experienced staff members.

Discussion

The *LWBW* program utilized traditional behavior change theories and strategies, to benefit from prior knowledge of our own and others' successful behavior change programs. This approach conformed to recommendations for translating diabetes prevention studies to use goal setting with individually-tailored goals based on stages of change, self-monitoring, coaches (counselors) and other participants to provide support, and a problem-solving approach to deal with barriers.^{8, 9} The *LWBW* approach also addressed four translation priority areas³ given that it: 1) focused on vulnerable, understudied groups; 2) had good external validity due to very few exclusion criteria, making it more generalizable to other lower-income populations; 3) was a partnership between researchers and a public health department, thus reflecting their shared perspectives, and 4) was designed with sustainability in mind, i.e., delivered by health department staff and thus already embedded in the health department.

Since *LWBW* was developed, several translations of the DPP have been published. Translations into community-based settings include one offered in a YMCA setting,⁵ one for residents of an urban, medically underserved community offered by community hospital staff,⁶ and one for underserved Latino patients in a health center.⁷ The latter also was based on an academic-community partnership, offered in Spanish, and designed for low-literacy persons. Translations of the DPP lifestyle intervention into clinical settings are more common.³⁴⁻³⁷

Most of the components and content of LWBW are not unique, as well-proven methods from other behavioral change programs were utilized, including principles of behavior change, telephone-based counseling, action plans, and skills training. Most of the content was adapted from a variety of sources (noted in Table 1). What is unique is the complete LWBW translational model, designed specifically for Spanish- and English-speaking low-literacy populations, focused on self-selected and sustainable goals, to be delivered by staff typically employed by public health departments, and offered in local community-based facilities. Our use of the infrastructure and staff at the health department to deliver the intervention using a telephone-based delivery system has previously not been tested in diabetes risk reduction studies. All of the translational models published recently utilized a group-based approach, similar to the DPP.

By focusing entirely on underserved communities, the project reached people who often do not participate in such programs such as African American men, Spanish-speaking Latinos, people living in group homes, and those with mental health needs. To accomplish this, *LWBW* was designed with convenience as a priority by utilizing a telephone-based intervention and holding all in-person and group-based components in accessible community-based settings (considered critical to being culturally competent).³⁸

Although information was provided on all four behaviors, counselors encouraged participants to focus on one specific, attainable goal of their choice that, once achieved,

could be sustained. This allowed participants to experience success (build self-efficacy) and add other new behaviors once their original goal was achieved. While this potentially may limit the efficacy of the intervention, this motivational interviewing and goal setting strategy was employed to give participants ownership and choice of behavior changes they were ready to make. Thus, participants learned transferable behavior change skills that ultimately could be applied to other behavior changes.

Conclusion

Sustainability has been defined as the process of program institutionalization after the original funding ends, ³⁹ i.e., the infrastructure that remains in a community. Programs may be more readily sustainable if they are delivered from the beginning by staff in community settings. To ensure adequate translation of research into practice, Brownson and Jones ⁴⁰ suggest that research trials be designed by involving end users of interventions. *LWBW* is a prime example of this approach given that it was delivered by health department staff in local community venues. By utilizing about one FTE in total, it may be feasible in other health departments and community settings.

Chronic disease prevention is a longstanding priority of the City of Berkeley Public Health Department. This includes efforts, in collaboration with community organizations, to address several chronic diseases such as diabetes, high blood pressure, and heart disease through primary prevention. Because diet and physical activity are also risk factors for other chronic conditions, programs such as LWBW can address multiple conditions simultaneously. LWBW is being integrated into this broader framework, with plans to expand the approach to other prevention programs such as smoking prevention/cessation and hypertension screening and control.

Implications for Policy and Practice

As for implementation into other public health departments, two factors suggest that such lifestyle programs are more relevant than ever. First is the alarming increases in rates of obesity and diabetes, especially in underserved populations. ⁴²⁻⁴⁵ Second, primary prevention strategies such as lifestyle programs could address the increased costs to society and the health care system of obesity, diabetes, and physical inactivity. ⁴⁶⁻⁴⁹ Among the possible policies to address this societal problem, U.S., state, and local health departments are excellent venues for providing lifestyle programs for underserved populations. The public also is more aware of the need for prevention, thus providing a population base of individuals potentially interested in such community-based programs.

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Table 1 Education, Skills, and Possible Behavior Changes Relevant to the Four Core Themes

Core Themes	Education and SkillsRelevant to Core Themes	Possible Behavior Changes Pertaining to Core Themes	
Get Active			
Being physically active can prevent diabetes	• Types of physical activity - flexibility, strength, aerobic ^{50, 51}	Gradually increase duration or intensity of activity	
	• Guidelines (30 min 5 days/week) ^{50, 52}	Start by walking 10 minutes a day	
	• How to incorporate exercise into daily routine ^{53, 54}	For instance walking children to school	
	• Walking emphasized – practical, low cost, accessible 55, 56	 Increase other activities such as gardening 	
	• Safety, importance of progressing gradually ^{50, 51, 53}	• Reduce sitting time, e.g., watching	
	 Tracking physical activity using pedometer and an activity log³² 	TV ⁵⁸ • Find an exercise buddy or join a	
	 Overcoming barriers to physical activity and staying motivated^{31, 53, 57} 	group	
Eat Smart			
Choosing healthy foods and eating	 Type and amount of food matters in preventing diabetes^{22, 23} 	• Reduce portion sizes ⁶⁴⁻⁶⁶	
smaller portions can	What are carbohydrates (whole vs. refined grains) and	• Use smaller plates and bowls ^{64, 67}	
prevent diabetes	how they affect blood sugar ^{59, 60}	 Read food labels 	
	• How to use the food pyramid ¹⁴	 Eat foods with lower fat content^{68, 69} 	
	 Recommended amounts: fats, carbohydrates, sodium, fiber⁶⁰ 	Choose foods high in fiber	
	Demonstrate amount of sugar in soft drinks, amount of	 Increase water intake 	
	fat in a hamburger ⁶¹ • Importance and benefits of water ⁶²	• Decrease consumption of sugary beverages ⁷⁰	
	Monitoring food intake		
	• How to read food labels ⁶³		
Eat your Colors			
Eating fruits and	• Serving sizes of fruits and vegetables ⁷¹	 Gradually increase consumption o fruits and vegetables to at least 5 	
vegetables can prevent diabetes	 Importance of high fiber diet for diabetes prevention²², 23, 72, 73 	servings per day	
	 Benefits of choosing colorful fruits and vegetables^{60, 74, 75} 	Eat variety of fruits and vegetableChoose colorful ones	
	 Fruits and vegetables are lower-calorie alternatives, can promote weight loss⁷⁶ 		
	How to save money when buying fruits and vegetables		
Eat Breakfast			
Eating breakfast can	• Provides energy and regulates metabolism ^{77,78}	Eat breakfast every day	
prevent diabetes	• Helps reduce daily caloric intake ²⁵	Include protein and vegetables in breakfast	
	• Important part of weight management ^{79, 80}		
	Increases ability to think and concentrate	 Substitute white bread or pastry with whole-wheat bread 	
	• Quick breakfast ideas ⁶⁰		

Core Themes	Education and SkillsRelevant to Core Themes	Possible Behavior Changes Pertaining to Core Themes
	 Planning a balanced breakfast⁶⁰ 	

NOTE: Multiple sources were used for the rationale and materials for each program feature; examples of these sources are cited including the rationale and materials;.

Table 2

Program Components

Component/Format/Timing		Objectives/Content	
Get Read	ly, Get Set		
•	One 1.5 hour introductory session	Check diabetes knowledge, correct misinformation	
Small group	Small group meeting with newly enrolled	Introduce program, core themes, and concept of action plans	
	participants and 1-2 counselors or health department staff	Show how to track physical activity and diet, encourage tracking for one week	
		Take home: pedometer, activity/food diaries, program binder	
Program .	Binder		
•	One 3-ring binder containing information on	Provide reference material covered throughout program	
	topics covered through entire program	Designed to "stand alone"	
		Designed to appeal to persons with low literacy	
		• Six sections: 1) Get ready, get set: prevent diabetes, 2) Plan better meals to control your blood sugar, 3) Food labels and diabetes prevention, 4) Stress and diabetes, 5) Get active, 6) Graduation and strategies for healthy living	
Personal .	Planning Session		
•	One 1-hour face-to-face meeting with	Introduce counselor, begin building relationship	
	personal counselor	Get to know current/past lifestyle, readiness, barriers	
•	2 weeks after Get Ready, Get Set	Review behavior tracking forms if appropriate	
		 Help participant build an agenda, create a personal goal and consider action plans based on readiness and personal interests 	
Telephon	ne Calls		
•	Telephone calls scheduled at participants' convenience	Build relationship	
	10 calls offered in first 6 months (program	Check in, support motivation and resolve ambivalence	
phase)	phase) and 2 in the 2 nd 6 months	Review readiness; help create new action plan	
•	(maintenance phase) Total possible 7.5 hours	 Provide ongoing participant-centered support, education, motivation and skills training based on readiness 	
		Suggest community resources, describe upcoming workshops	
Worksho	ps		
•	Group meetings, 1.5 hours each (total possible 9 hours)	Impart information	
	4 different topics, one offered each month	Provide hands-on skills training for behavior change	
	Graduation held monthly	 Provide motivation and reinforce behavior change through group support 	
		Increase self-efficacy	
		• Learn from others – observational learning	
Newslette	ers		
•	12 different newsletters, mailed monthly	Provide information about nutrition and exercise	
		Provide easy-to-make recipes	
		Offer motivational tips	
		Announce and describe upcoming workshops	

NOTE: All in-person sessions were held at local community centers