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Effectiveness of a Culturally Tailored Diabetes Self-Management Program for Chinese Americans

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Abstract

Purpose—The purpose of the study was to test the feasibility and efficacy of a diabetes self-management and education program for Chinese Americans in a support group format. The rationale for the study was to create culturally appropriate diabetes education and management programs in response to the growing diabetes prevalence among Chinese Americans. The investigators hypothesized that participants will have improved diabetes knowledge and practices, hemoglobin A1C, and social support. The study objectives were at least: 50% will have significant improvements in diabetes knowledge and practice activities, 30% of participants will have significant improvements in A1C, and 50% will report a gain in emotional support.

Methods—The program consisted of 12 90-minute diabetes education and support group sessions offered in a medical office setting. The sample included 23 Chinese Americans with either type 1 or type 2 diabetes. Using a single-group, pre-post test design, A1C and diabetes knowledge were assessed at baseline and 6 months. Data were collected through clinical assessments and written questionnaires.

Results—The results indicated high attendance and statistically significant increases in glycemic control and diabetes knowledge. Statistically insignificant differences were shown in diabetes management practices. Secondary outcomes assessed participants' perceived diabetes management and emotional and social support.

Conclusions—Diabetes Self-Management: A Cultural Approach (DSMCA) support group model demonstrates that a culturally tailored support group utilizing a community-based participatory research approach is an effective format to improve diabetes self-management skills among Chinese Americans. The program can be adapted for other ethnic populations. The efficacy of the intervention can be further tested in larger randomized trials.

Among Asian Americans, diabetes is the fifth leading cause of illness and death.[1] In 2011, the Centers for Disease Control and Prevention reported that the risk of diagnosed diabetes was 18% higher among Asian Americans compared to non-Hispanic white adults.[2] In the

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largest Asian American ethnic group, Chinese Americans,[3] diabetes prevalence estimates among adults range from 12% to 21% compared to 6.86% among non-Hispanic Whites.[4] Chinese Americans have higher odds of prevalent type 2 diabetes compared to non-Hispanic Whites despite having lower age- and sex-adjusted body mass index.[5]

Diabetes self-management and group education programs have been advocated due to positive patient outcomes,[6–8] yet, there is little evidence that such programs work for other ethnic minorities.[9] *Cultural tailoring* is a concept that utilizes the understanding of cultural characteristics' effects on health behaviors to design a useful intervention.[10] In a recent meta-analysis of 12 randomized controlled trials, Nam and colleagues[9] found that culturally tailored diabetes education interventions yielded greater improvements in glycemic control than usual care for ethnic minority individuals with diabetes. To our knowledge, limited studies[11] have examined the effectiveness of culturally tailored diabetes self-management education interventions for Chinese patients living with diabetes.

The impact of diabetes extends beyond physical health; quality of life, daily living practices (eg, meal planning, exercise, stress management), and family and community relationships are also affected. The experience of living with and managing diabetes is shaped by cultural beliefs and practices, family dynamics, and acculturation experiences.[12–14] Chun et al[14] identified several culturally informed conceptualizations of diabetes and diabetes management that may be unique to Chinese patients. In an interview study of Chinese immigrants with diabetes and their spouses, participants related diabetes to cultural beliefs about hot-cold balance and described the challenge of making dietary changes given their cultural beliefs about food and its centrality to quality of life and social relationships. Additionally, diabetes management for Chinese patients with diabetes requires accommodations by all family members.[12] Extant research suggests that orienting Chinese immigrant patients toward effective diabetes management may require making cultural adaptations to mainstream interventions.

Chinese immigrants have identified social support as integral to proper diabetes management,[15] yet different formats for diabetes education and management that have been studied among the general population have not been examined extensively within the Chinese immigrant community. Diabetes education and management for the general population in a peer support group setting has been reported to decrease A1C levels and increase feelings of social support from patients with diabetes.[16,17] Face-to-face peer support groups led by facilitators enable patients with diabetes to connect with their peers, cope with necessary behavioral changes, and assist others in disease management.[16,18] The unique component of peer support groups is its focus on management and impact of diabetes on daily life and overall well-being rather than pure diabetes education.[19] Various studies using other ethnic populations, such as Latino Americans,[20,21] Korean Americans,[22] and African Americans,[23] have shown support classes to be significantly more effective than individual counseling for diabetes management.

In response to the growing prevalence of diabetes and the lack of culturally appropriate disease education and management information, the Chinese Community Health Resource Center (CCHRC), a San Francisco nonprofit organization, and its partners developed a

novel, comprehensive diabetes self-management intervention. Three theoretical models commonly used in health intervention guided the intervention guided: the chronic care model (CCM),[24,25] theory of reasoned action (TRA),[26] and social cognitive theory (SCT).[27] CCM informed the goals and actions in providing the intervention. According to CCM (Table 1), chronic disease management requires appropriate coordination between multiple systems—the health system (which provides self-management support, decision support, delivery system design, and clinical information systems) and the community (which provides resources and policies)—and productive interaction between patients and health care teams (which includes physicians, nurses, and case managers). Both TRA and SCT informed the mechanisms through which the intervention was expected to yield positive health outcomes for participants. TRA suggests that attitude, social norms, and self-efficacy influence one's intentions to change health-related behaviors. According to SCT, health promotion and behavioral change are dependent on several psychosocial factors, including self-efficacy, social support, and outcome expectancies.

Guided by these theoretical models, the study utilized a community-based participatory research (CBPR) approach[28,29] to assess the effectiveness of Diabetes Self-Management: A Cultural Approach (DSMCA) support groups in enhancing diabetes-related outcomes.

Research Design and Methodology

Research Approach

CBPR involves collaborations between community members and researchers. The collaboration generates numerous benefits such as enhancing community commitment to research, identification of a socially important problem, validity of the intervention, and interpretability and applicability of the findings.[28] This approach brought together researchers and staff from CCHRC, leaders in the San Francisco Chinatown community, leaders and members of the Chinese Community Health Plan (CCHP), and researchers from University of California, San Francisco (UCSF) and University of California, Davis (UCD). The intervention's design and implementation were spearheaded by CCHRC, with academic researchers providing assistance on data analysis and input in data interpretation.

Participant Recruitment and Eligibility Criteria

Study participants were recruited from a convenience sample of members of CCHP and CCHRC's general health education program participants. Program educators introduced the DSMCA study at its eligibility screening session. Participant eligibility criteria included: at least 18 years old, speak Chinese (Cantonese) as their primary language at home, and have a clinical diagnosis of either type 1 or type 2 diabetes, A1C greater than or equal to 7.0%, able to attend at least 7 out of 12 sessions, and participate in pre- and post-intervention assessments.

Intervention Design

The DSMCA program's curriculum was based on American Diabetes Association (ADA) standards.[30] The curriculum design team comprised of physicians, nurses, dietician, certified diabetes educator, and patients. All intervention materials, including participant handouts

and booklets, were written at a Chinese layman fourth-grade level. To ensure information was culturally appropriate, program educators incorporated Chinese commonly practiced activities and food items into the educational curriculum and in-person sessions. Examples of such activities included conducting tai chi classes in place of typical exercise classes, stress management strategies such as reciting Chinese poetry, and addressing myths related to herbal and Western medicine. Program educators also introduced healthier alternatives, for example, the distribution of brown rice samples to participants to replace the more preferred white rice–related items (congee and soups with a high content of carbohydrates). The class curriculum and handouts were reviewed by Certified Diabetes Educators (CDEs) and endocrinologists as well as focus group tested with the target population.

The program was implemented in a 6-month period and consisted of 2 key intervention components: support group sessions and a bilingual booklet on diabetes management. Support group sessions were held in a medical office building in San Francisco Chinatown, and all activities were conducted in the participant's native language (Cantonese).

Support group sessions—To increase self-efficacy, social support, and reinforcement and address attitudes and social norms about diabetes self-management behaviors, the program included a series of 12 biweekly 90-minute support group sessions led by a multidisciplinary and bilingual team (Program Educators) who delivered culturally appropriate health education. Program Educators included registered nurse, registered dietitian, a CDE, and health educators. Sessions covered topics on meal planning, medication compliance, blood glucose monitoring, physical activities, eye and foot care, dental care, stress management, and blood pressure and cholesterol control.

To encourage consistent participant engagement and satisfaction throughout the series, program educators sought feedback on a regular basis. Participants provided feedback for program improvement through program evaluations, question and answer sections during the in-person support groups, and weekly reminder calls. Program educators incorporated this feedback into the educational curriculum. Incentives given to participants included medication organizers, personalized medication lists and cards, basic first aid kits (bandages and hand sanitizers), and other health promotional items to increase attendance and reinforce participants' adherence to recommendations for better diabetes management. Participants received Certificates of Completion at the last session of the 6-month series.

Bilingual booklet—Program participants received a bilingual 67-page booklet developed by CCHRC titled "Diabetes Management." The booklet was developed due to a lack of culturally appropriate diabetes prevention and management information in Chinese. Collaborating with the ADA, CDEs, and physicians (ie, endocrinologist), the booklet was developed and focus group tested among its target population. The booklet consists of 13 chapters that focus on diagnosis, recommended dietary and self-management guidelines, complications of uncontrolled diabetes, physical activity, and medication compliance.

Methodology

The study utilized a single group, pre- and post-test design and clinical A1C assessments to evaluate the feasibility and efficacy of the DSMCA program. Due to limited funding and

resources, the study was only able to employ a single group, pre- and post-test design. Participants did not receive incentives for completing pre-and post-questionnaires and A1C assessments. The in-language pre-and post-questionnaires were focus group tested for readability and cultural appropriateness.

Feasibility Outcome Measure

We assessed the feasibility of the program by reporting the number of sessions attended by participants. Program Educators recorded attendance at each session.

Primary Efficacy Outcome Measures

Glycemic Control—According to the American Diabetes Association,[31] the A1C test measures an individual's average glycemic control for the timeframe of 3 months. The investigators decided to measure glycemic control at 6 months from baseline to allow sufficient time for lifestyle changes. A1C was assessed through blood glucose checking using a disposable A1C analyzer (Contour® Blood Glucose Meter 9545C, Bayer, Tarrytown, New York) by a registered nurse. The study considered a decrease in A1C (at 6 months compared to baseline) as an improvement. A ≥1.0% change was defined as a clinically significant improvement according to National Institute of Diabetes and Digestive Kidney Diseases.[32] Every percentage point drop in A1C reduces the risk of microvascular complications (eye, kidney, and nerve disease) by 40%.

Diabetes Knowledge—Participants' diabetes knowledge was measured by a 5-item questionnaire in a multiple choice format. The items were written to assess participant's knowledge of ADA's Clinical Practice Recommendations.[30] A knowledge score was computed based on the number of correct responses out of the 5 questions, which ranged from 0 (none was answered correctly) to 5 (all items were answered correctly). For descriptive purposes, we defined a clinically significant knowledge gain as a 1 point increase in knowledge score.

Diabetes Practice Activities—Participants' diabetes practice activities were measured by an in-language 4-item self-report questionnaire. The items assessed the three different diabetes practice activities (blood glucose monitoring, physical activity, dietary regimen), such as, "In the past week, how many times did you check your blood glucose?" and "How many times per week do you engage in 5–10 minutes of physical activity?" Changes in diabetes practice activities were assessed by whether responses corresponded with the related ADA Clinical Practice Recommendations.[30]

Secondary Efficacy Outcome Measures—Secondary outcomes were descriptive measures assessing participants' perception of improvements made in diabetes self-management and received emotional and social support obtained via a self-report questionnaire at 6 months after enrollment.

Statistical Analysis

Descriptive statistics of the feasibility and efficacy outcome measures were calculated. For the primary efficacy outcomes, we conducted paired sample *t* tests (2-sided) to detect

differences in A1C and diabetes knowledge scores between baseline and at 6 months after enrollment. An alpha level of 0.05 was used to determine statistical significance.

Results

Participant Characteristics

Study participants were recruited from a convenience sample of the CCHRC general health education program participants. Program educators introduced the DSMCA study at the seminar and also screened for eligibility. Twenty-seven participants consented to and participated in the pre-intervention assessments for changes in knowledge, practice activities, and A1C. Among these participants, 23 participants completed post-assessments and were included in the analyses of the efficacy outcomes. However, changes in glycemic control were assessed for 19 of the 23 participants due to medication changes (n = 2), other medical reasons (n = 1), and an outlier value in A1C at 6 months (n = 1). Table 2 provides detailed information about participants.

Program Attendance—Out of the 27 consented participants, 14.8% (n = 4) attended <4 sessions including 1 participant who had to discontinue the program after the third session due to a medical condition. The majority of the participants, 85.2% (n = 23), attended at least 7 out of the 12 sessions of the 6-month program. Among the 23 participants who also completed the post-assessments, the number of sessions attended ranged between 7 and 12 (M = 10.36, SD = 1.59), with 74% (n = 17) completing at least 10 of the sessions and 26% (n = 6) completing all 12 sessions.

Glycemic Control Improvements

There was a statistically significant decrease in the A1C observed at 6 months from baseline, $t(18) = -4.04$, $P = 0.001$. At baseline and 6 months, the group mean of A1C were 7.87% ± 0.97% (95% CI, 7.40%–8.34%) and 7.11% ± 0.62% (95% CI, 6.81%–7.41%), respectively. At 6 months after enrollment, 42.1% (n = 8) of the participants had a clinical significant glycemic control improvement by achieving ≥1.0% decrease in A1C; 31.6% (n = 6) had slight improvements in A1C (<1.0% decrease); and 26.3% (n = 5) had no improvement or increase in A1C (≤ 0.0% decrease) from baseline.

Diabetes Knowledge Gain and Practice

A statistically significant increase in knowledge scores was observed at 6 months, $t(22) = 3.06$, $P = 0.006$. At baseline and 6 months, participants had a mean diabetes knowledge score of 2.70 ± 1.40 (95% CI, 2.09–3.30) and 3.74 ± 0.81 (95% CI, 3.39–4.09), respectively. At 6 months, 56.5% (n = 13) of the participants achieved a clinically significant diabetes knowledge gain as indicated by at least 1 point increase in knowledge scores from baseline to 6 months; 43.4% (n = 10) of participants scored the same or less at 6 months. Results indicated changes in diabetes practice activities at 6 months post-baseline, but were not statistically significant.

Other Descriptive Secondary Outcomes

Out of the 12 sessions of the 6-month program, the number of sessions attended ranged between 7 and 12 (M = 10.36, SD = 1.59). Among the 23 participants, 74% (n = 17) completed at least 10 of the sessions, and 26% (n = 6) completed all 12 sessions. At 6 months, 82.6% (n = 19) stated that they were able to better manage their diabetes, 78.2% (n = 18) reported gaining emotional support, and 52.1% (n = 12) stated they appreciated the opportunity to gather with other individuals living with diabetes.

Conclusions and Implications

The present study demonstrates the feasibility and potential efficacy of a culturally tailored diabetes self-management support group intervention for Chinese Americans. DSMCA facilitated dynamic interactions among patients with diabetes and program educators. This intervention sustained participation, increased knowledge, and resulted in better glycemic control for patients with diabetes, thereby mitigating their risks for microvascular problems.[32]

The intervention design, including cultural tailoring, was grounded in public health and psychological theories of chronic illness management, behavior change research available on Chinese individuals, and knowledge provided by physicians and health educators serving the Chinese community, patients living with diabetes, and community members. Important features included intervening with multiple systems (eg, intra-individual, caregiver-patient interactions, couple-provider interactions, health systems), focusing on education, and building behavioral and interpersonal skills.

Based on participants' feedback, it appeared that the intervention met their cultural needs. First, Program Educators conducted the face-to-face sessions in the participants' native language (Cantonese). Additionally, the educators had expertise in working with the Chinese community and culturally tailored their teaching styles, curriculum, handouts, and dietary recommendations to fit participants' needs and culture. During the face-to-face sessions, healthy food choices (ie, brown rice), which participants were not familiar with, were given as samples to try at home. Second, the educators were readily available throughout the program to answer questions and provide support during and after class meetings. Third, Chinese culture frames the educator as a "knowledge holder," someone who possesses much knowledge. As a result, teachers are highly revered by students.[33] Participants' trust in the educators of having medical authority promoted their adherence to diabetes management regimens. Lastly, the educators provided personalized support. For example, the educators helped to personalize dietary and medication regimens through handwritten notes and completed personalized medication cards.

The program's frequent solicitation of and responsiveness to participants' suggestions for program improvement also contributed to DSMCA's success. For example, participants suggested additional alternative food choices that are culturally appropriate. Due to the smaller class size and having the same educators throughout the program, the support group format provided an intimate setting in which participants developed trust for and rapport with program educators and other participants. This rapport allowed participants to feel

comfortable with sharing their thoughts and troubles with others. Many participants expressed they had gained emotional support and skills in better managing their diabetes through the support group format. Additionally, participants appreciated the opportunity to gather with other individuals living with diabetes.

Verbal feedback from participants also indicated that their caregivers were positive influences on diabetes management. Participants reported that caregivers assisted in daily management activities, including reminders to take medications, preparation of diabetic-friendly meals, and accompaniment to physician visits. However, due to limited financial resources, the study did not assess the effect of the caregiver on diabetes management. To our knowledge, limited studies[13] have examined the role of the family caregiver in the management of diabetes. Chesla et al[13] reported that Chinese families are integrally involved in diabetes management, as they are interpreting symptoms and constructing disease management responses. In the same study, diabetic symptoms reportedly challenged family harmony and relationship with the caregiver, as patients with diabetes became more irritable when symptoms exacerbated (ie, higher glucose levels). More studies are needed to examine the social and family impacts on diabetes symptoms as well as the reciprocal role of responsibilities among different family caregivers.

The study utilized multiple methods to encourage consistent participation and attendance. Program educators made follow-up reminder calls to encourage attendance and answer participants' questions. Health promotion incentives were provided at no charge to increase participation among attendees and encourage changes in their health behaviors. Other resources made available to participants aided their diabetes management. For example, provided printed and online bilingual information acted as reinforcement tools of material learned from in-person sessions. A patient navigator was available 6 days per week to locate online bilingual health information for participants, provide additional guidance for utilizing glucose meters, and connect participants with potential resources that would aid in their diabetes management.

The CBPR approach was an integral contribution toward the success of the study. The level of involvement and collaboration vary widely; unequal power differentials, with academics holding more power than community members, is often cited as a major challenge of CBPR. In our case, CCHRC, a nonprofit, community-based organization, initiated and directed all aspects of the research study. Feedback from community members provided valuable suggestions to ensure the program was most effective for the target population. Partnership between the community and academia leveraged resources, particularly in data analysis phase.

Conducting in-person groups posed resource and financial challenges. Participant recruitment also served as a challenge due to the timing of the support groups since sessions were offered in person. The program was inaccessible for patients with diabetes who were unavailable for the weekday morning sessions, and thus attracted individuals living with diabetes from primarily the 60 to 90 years age group. Innovative programs gaining empirical support include those utilizing phone and Internet technologies,[34,35] for which in-person

attendance is not required. Such interventions, if culturally adapted, may be appropriate for Chinese immigrants.

A limitation of the current study is the lack of a comparison group. As a pragmatic study design in a practice-based setting, the investigators were unable to control for other factors, such as other available health resources, that may have contributed to improvements in diabetes knowledge and glycemic control. Although the framework for the intervention was theoretically based, we are unable to discern through what mechanisms the intervention was effective due to the lack of data collected on possible mediators, including self-efficacy, social support, patient-provider communication, and patient- caregiver dynamic. Other clinical indicators associated with diabetes such as blood pressure, cholesterol, and weight were not assessed due to limited resources. The intervention was conducted using a convenience sample of currently insured patients subscribed to a local health care association that advertises itself as providing culturally competent health care to Chinese populations. The study was conducted in a setting with a high concentration of Chinese immigrants and access to high-quality health care and resources. Thus, study results cannot be generalized for all Chinese individuals living with diabetes.

Despite the limitations, the current study provides preliminary support that this intervention is effective for older, Chinese American immigrants with diabetes. There are several features of the pilot intervention's design and implementation that may prove useful for researchers and practitioners interested in promoting health behaviors, ameliorating chronic physical illness, and conducting intervention research within Chinese American immigrant communities. The current study points to possible mechanisms of change in diabetes self-management interventions. Additional research conducted through randomized clinical trials and dismantling studies is needed to test whether the proposed mechanisms are effective in enhancing diabetes self-management. However, as a pragmatic trial,[36] these results can immediately influence decision making in medical settings similar to that of the current study

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Table 1

Intervention Operationalization of Theoretical Concepts From the Chronic Care Model

Theoretical Concept	Intervention Operationalization
Self-management support: This component "empowers and prepares patients to manage their health and health care" (ICIC, 2011).[a]	• Conducted health education, clinical assessments, and social support groups to assist patients in managing their diabetes. • Provided diabetes knowledge and informational resources to prepare all participants for better diabetes management. • Worked with participants to set diabetes management related personal goals, action planning, and problem-solving skills.
Decision support: This component "promotes clinical care that is consistent with scientific evidence and patient preferences" (ICIC, 2011).	• Integrated evidence-based clinical and educational guidelines into the program to change participants' behavior and practices. For example: Chinese-translated instructions for using glucose meters, explanation of medications, personalized medication cards to assist patients in medication adherence, and personalized food diaries. • Program Educators received continuing medical education to stay updated on current practices and evidence. • Participants were provided opportunities during the in-person sessions to exchange experiences and helpful tips for guideline compliance. • Program Educators promoted and facilitated patient-physician communication.
Delivery system design: This component "assures the delivery of effective, efficient clinical care and self-management support" (ICIC, 2011).	• Chinese Community Health Plan established nurse-led case management for patients with diabetes who were identified from diagnostic codes, charts, and assessment using specific criteria. For ambulatory patients, those needing clinical support and one-on-one education were referred to its network clinics and physicians while needing group education were referred to Chinese Community Health Resource (CCHRC) for the diabetes support group sessions. • To ensure information was culturally relevant as well as linguistically appropriate, program educators focused the educational curriculum and in-person sessions on familiar activities and dietary guidelines commonly practiced by the Chinese community. • The class curriculum and handouts were reviewed by Certified Diabetes Educators and endocrinologists as well as focus group tested with the target population.
Clinical information system: This component "organizes patient and population data to facilitate efficient and effective care" (ICIC, 2011).	• Established clinical information system to record clinical and educational outcomes from which all involved parties retrieved data.
Community resources: This component "mobilizes community resources to meet patient needs" (ICIC, 2011).	Additional community resources related to diabetes care were identified by Patient Navigation Program to encourage patient usage and participation. For example, program educators provided online resources in addition to CCHRC's bilingual health information Web site (www.cchrchealth.org) that participants could access for additional information. For participants who are computer illiterate, patient navigators assisted in identifying and locating community resources related to diabetes care.
Health system organization of health care: component "creates a culture, organization, and mechanisms that promote safe, high quality care" (ICIC, 2011).	Performance measures from the National Committee for Quality Assurance's This Healthcare Effectiveness Data and Information Set (HEDIS) were incorporated to improve chronic disease care, including diabetes.

[a] Improving Chronic Illness Care (ICIC), 2011.

Table 2

Demographics of Support Group Participants

Demographic Item	Number of Participants (N = 23)	Percentage of Participants
Gender		
Male	11	47.8
Female	12	52.2
Age (in years)		
60–69	3	13
70–79	12	52
80–89	5	22
Undisclosed	3	13
Highest education level		
No schooling	2	8.69
Sixth grade or below	2	8.69
Elementary school graduate	7	30.43
Middle school graduate	7	30.43
High school graduate	2	8.69
Some college	3	13.04
University graduate	0	0
Annual household income (in dollars)		
<10,000	9	39.13
10,001–20,000	2	8.69
20,001–35,000	0	0
35,001–50,000	1	4.35
50,001 and over	1	4.35
No reply	4	17.39
Ethnicity		
Chinese	23	100
Healthinsurance		
Private	23	100
Public	0	0
Diabetes chronicity(in years; n = 22)		
1–3	4	18.2
4–6	3	13.6
7–10	0	0
11–19	7	31.8
20+	4	18.2
Unknown	4	18.2