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Authors

Chen, Jyu-Lin
Kwan, Monica
Mac, Allison
[et al.](#)

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Title: iStart Smart- A primary-care based and community partnered childhood obesity management program for Chinese-American children

Authors: Jyu-Lin Chen¹, Monica Kwan², Allison Lam¹, Nai-Ching Chin¹, Katrina Liu²

Jyu-Lin Chen¹, PhD, RN, CNS, Associate Professor, School of Nursing, UCSF

Monica Kwan², MD, Pediatrician, North East Medical Services, San Francisco, CA

Katrina Liu², MD, Pediatrician, North East Medical Services, San Francisco, CA

Allison Mac, BS, RN, School of Nursing, UCSF

Nai-Ching Chin, MS, RN, School of Nursing, UCSF

Institutional Affiliation:

1. Department of Family Health Care Nursing, University of California, San Francisco
2 Koret Way, San Francisco, CA 94143-0606
2. North East Medical Services, San Francisco
1520 Stockton St, San Francisco, CA

Corresponding and requesting for reprints author:

Jyu-Lin Chen, PhD, RN, CNS

University of California, San Francisco

Department of Family Health Care Nursing

2 Koret Way

Box 0606

San Francisco, CA 94143

Phone- (415) 502-6015

Fax- (415) 753-2161

Email: jyu-lin.chen@nursing.ucsf.edu

Introduction

Excess weight in children is associated with many medical and psychosocial problems.[1] In obese children a reduction of BMI of only 5% is associated with improvements in insulin sensitivity and lipid profiles.[2] Primary care clinics provide an ideal setting for the development of obesity management programs in high risk minority children because of their accessibility.[3] Primary care clinics allow access and outreach to large proportions of the community, especially underserved, low-income, and new immigrants. Partnership with community centers or other settings where children can gain access to recreational opportunities is another important step towards developing a successful program, especially for low income families with less available resources. [4]

Thus, we conducted a pilot program targeting weight management in low income Chinese immigrant children co-located at a community-based center and a primary care clinic. The purpose of the study was to explore the feasibility and efficacy of a culturally sensitive, evidence-based obesity intervention for Chinese American children in a community-based and primary care setting.

Methods

An experimental design with a historical control group was used in this study. A total of 21 overweight and obese Chinese American children completed the intervention and 20 overweight and obese Chinese American children from a previous study provided data for a comparison group. Chinese American children who were 7-12 years old and overweight or obese and their parents were eligible for enrollment if they met the following criteria: (1) The adult and child self-identified ethnicity as Chinese or of Chinese origin, and they reside in the same household. (2) The child was able to speak and read English. (3) The child was in good health,

defined as free of an acute or life-threatening disease. (4) Parents were able to speak English, Mandarin, or Cantonese and were able to read in English or Chinese. The University of California San Francisco Committee on Human Research approved the study.

Study Procedure and Intervention

Providers in a primary care clinic recruited overweight and obese children who met the inclusion criteria for an 8-week play-based childhood obesity intervention at a neighboring community center. For baseline assessment, children in the intervention had weight, height, blood pressure (BP), waist circumference measured and wore Actigraph monitors for 1 week to measure physical activity levels. The intervention group also completed questionnaires regarding dietary intake, self-efficacy, and physical activity at baseline (T_0), 2 months (T_1) and 6 months (T_2) post-baseline. Children in the comparison group had weight, height, and BP measured at the same intervals as the intervention group.

iStar Smart Overview

iStar Smart program was based on the social cognitive theory.[5] After 10 children and their families had been assigned to the intervention group, the parents and children met separately for small-group sessions. Children attended 8-weekly, 1.5 hour small group sessions while parents attended a single 1-hour parent workshop. A bicultural, bilingual research assistant taught 30 minutes of interactive health curriculum, and community center staff led 60 minutes of exercise each session. A parent workshop conducted in Chinese and English discussed both Chinese and Western diets and ways to increase physical activity in urban, under-resourced communities. Medical care was integrated into the program through individualized weight management supervised by a pediatrician.

iStart Smart consisted of educational play-based activities teaching self-efficacy, critical thinking, and problem-solving skills related to nutrition, physical activity, and coping. The intervention was designed to improve self-efficacy and self-competence via interactive activities and to promote internal motivation to change health behaviors and maintain a healthy weight. Short video clips were developed and viewed during the program as a way to standardize the curriculum. Video clips used story-telling to teach health topics. Hands-on activities accompanied each video clip to reinforce the concepts being taught. For example, children learned how to select healthy meals based on MyPlate through the video clips, and then they role-played and practiced making healthier options for themselves. Additional multimedia was used in the curriculum through an interactive dietary preparation software program developed by Joslin Diabetes Center Asian American Diabetes Initiative, which included common foods in the Chinese diets. In each session, children engaged in lessons related to nutrition, physical activity, and critical thinking.

Children spent 60 minutes of each class exercising, weekly for 8 sessions. Exercise classes were taught by trained community center staff with years of experience working with children. They engaged in different types of exercise, such as basketball, dodge ball, and badminton. In addition, children received a pedometer, activity diary, and books related to physical activity. They were encouraged to document their pedometer readings and challenge themselves to achieve 10,000 steps a day.

A one 1-hour parent workshop was incorporated into this study to provide reinforcement and social support at home. The workshops included sets of exercises to increase parents' knowledge and skills regarding healthy food preparation, discussion of issues related

to dealing with children's eating habits, and maintaining healthy weight tailored to the needs of each family.

Children in the historical control group had their weight, height, and blood pressure measured at the same interval as children in iStart Smart. All children completed their assessment and their questionnaires in English, and parents completed questionnaires in either Chinese or English.

Parental Measures

Family information. Parents completed a 12-item questionnaire about parent(s)' and children's ages, family income, and parents' levels of education.

Suinn-Lew Asian Self-Identity Acculturation Scale (SL-ASIA). It is a 21-item multiple-choice questionnaire that contains questions related to parental acculturation level. [6]

Program evaluation. It consists of 8 multiple-choice items for evaluating the program.

Children's Measures

Body Mass Index (BMI). BMI for children was calculated by dividing body mass in kilograms by height in meters squared (kg/m^2).

Waist circumference. It was measured midway between the lowest rib and the superior border of the iliac crest.

Blood Pressure. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured by using a mercury sphygmomanometer with specific cuff size appropriate for children (Baumanometer, W. A. Baum Co, Copiague, New York).

Actigraph. Children were instructed to wear the actigraph (Manufacturing Technologies, Inc, dual-mode actigraph, model 7164) [7] that was positioned above the iliac crest of the right hip for 7 days.

Physical Activity Knowledge. A five-item questionnaire assessed children's knowledge about physical activity.

Dietary Knowledge. This 14-item survey measured knowledge about healthy food. [8]

Child Dietary Self-efficacy. This 15-item self-report questionnaire measured children's self-confidence in their ability to choose foods low in fat and sugar.[8]

Physical Activity Self-efficacy. This five-item questionnaire was used to measure the children's self-confidence in their ability to participate in various physical activities.[9]

Program evaluation. Children completed a 6-item program evaluation questionnaire.

Data Analysis

T tests were used to examine for differences in variables between intervention and control groups at the baseline. Linear mixed-effects models were used to examine difference in change of BP and BMI between the children in the intervention group and the comparison group. All analyses were performed in SPSS 18.0, with 0.05 set as the required level of significance.

Results

Approximately 72% of children in the intervention group and 54% of children in the control group were boys. The average education level for mothers in the study is 11.6 (SD = 3.8 years) and father is 12.4 (SD = 3.81 years). The mean Acculturation score is 1.99 (SD = .48), indicating a low acculturation population. About 90% of families in the study reported annual household income less than \$40,000. No significant difference was found between children in the intervention and control groups in baseline characteristics (Table 1).

Children in the intervention group had statistically significant improvements in BMI, BMI percentile, systolic BP, diastolic BP, nutrition knowledge, and nutrition self-efficacy after the intervention. Mixed models also revealed that children in the intervention group significantly

reduced their BMI compared to children in the control group ($F = 8.65$, $p = .004$) from baseline to 6 months post-baseline. No significant differences in BP were found between the intervention and control groups.

Attendance rate was high at 90%. Approximately 70% of children and 91% of parents in the intervention reported the program was fun or really fun, 79% of children reported eating more vegetable and fruit, and 68% reported being more active after joining the program.

Discussion

The results of this primary care and community-based childhood obesity intervention reveal significant reduction in overweight and obese children's BMI and BP, and improvement of knowledge and self-efficacy related to nutrition at 6 months post-baseline. In addition to the improvement of BMI and BP, the intervention was well received by children and families, with high attendance and positive program evaluations.

The current Expert Committee recommendations for the prevention, assessment, and treatment of overweight and obesity for children calls upon primary care providers to be at the center of a nationwide effort to address the pediatric obesity epidemic.[10] iStart Smart represents a unique partnership between primary care, academic, and community-based organizations to promote the health and weight management of underserved, low-income Chinese American immigrant children in San Francisco Bay Area. Because childhood obesity is associated with many adverse health consequences,[2] An intervention targeting overweight and obese children is critical.

Childhood obesity prevention is a top health priority of Healthy People 2020. Partnering primary care clinics and community centers creates increased access and resources for the families that desperately need effective childhood obesity interventions. As obesity in childhood

tends to persist into adulthood, starting obesity management in childhood is a necessary strategy to combat the epidemic. Findings of our study suggest that this type of intervention is feasible and has short-term efficacy for reducing BMI and BP in overweight and obese children.

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Table 1. Study variables

	Intervention			Control		
Variables	T0	T1	T2	T0	T1	T2
BMI	25.53 (3.65)	25.16 (3.91)	24.53 (4.20)	23.17 (1.22)	23.18 (1.28)	23.20 (1.31)
SBP (mmhg)	106.9 (5.75)	95.52 (14.49)	99.71 (10.87)	101.33 (4.56)	99.64 (2.80)	98.80 (4.73)
DBP (mmHg)	62.73 (7.11)	52.86 (9.83)	57.81 (12.02)	59.92 (11.20)	59.27 (10.51)	58.80 (11.94)
Waist circumference (inches)	32.53 (4.43)	32.02 (4.24)	32.2 (4.38)			
Moderate-to-vigorous activity (mins/day)	72.96 (83.53)	109.01 (62.62)	118.3 (75.53)			
Sedentary time (mins/day)	83.07 (55.29)	66.46 (54.08)	57.52 (52.53)			
Veg & Fruit intake (serving/day)	2.9 (1.22)	3.39 (1.14)	3.84 (1.38)			
Nutrition Knowledge	8.04 (3.26)	9.54 (2.33)	9.83 (1.82)			
Physical Activity Knowledge	3.13 (1.2)	3.56 (.63)	3.69 (1.14)			
Nutrition self-efficacy	2.19 (.54)	2.47 (.40)	2.57 (.37)			
Physical activity self- efficacy	2.14 (.41)	2.25 (.57)	2.42 (.37)			

T0-baseline assessment

T1-2 months post baseline assessment

T2-6 months post baseline assessment

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