Article

Clinical Pediatrics
1–7

DOI: 10.1177/0009922815592608
cpj.sagepub.com
SAGE

Short-Term Efficacy and Correlates of Change in Health Weight Management Program for Chinese American Children

Jyu-Lin Chen, RN, PhD, FAAN[1] and Monica Kwan, MD[2]

Abstract

A pretest and posttest study design was used to test a healthy weight management intervention with overweight and/or obese Chinese American children. Children attended 8-weekly small group sessions while parents attended a single 2-hour parent workshop. Children had their weight, height, blood pressure, waist and hip circumference, and fast lipids data assessed and completed several questions questionnaires regarding food choices, self-efficacy, and knowledge at baseline, 2 months, and 6 months. Parents completed questionnaires regarding demographic, acculturation level and family environment. We found significant reduction of body mass index, waist/hip ratio, systolic blood pressure and improvement of child's eating style, physical activity knowledge, self-efficacy, and children's quality of life at 6-month follow-up. In addition, significant improvement of high-density lipoprotein cholesterol and decrease in triglyceride were found at 6-month follow-up. Improvement of nutrition self-efficacy and decreased stimulus environment were associated with decreased body mass index in overweight and obese Chinese American children.

Keywords

childhood obesity, healthy weight, nutrition self-efficacy, family stimulus environment, body mass index

Introduction

Childhood obesity is one of the most prevalent public health concerns facing health care providers today, especially among minority immigrants such as Chinese Americans, who are the largest and fastest growing Asian subgroup in the United States. Approximately 25% of Chinese American children are overweight or obese.[1] Although the prevalence of childhood obesity in Chinese Americans is not higher than Whites, Chinese Americans have a higher percentage of body fat and a higher risk of developing cardiovascular disease than non-Hispanic whites at the same body mass index (BMI).[2,3]

Childhood obesity increases the risk for adverse physical health, including type 2 diabetes mellitus and cardiovascular disease risk factors.[4,5] A recent systematic review of literature on 378 studies on the prevalence of metabolic syndrome in children found that overweight or obese children are 3 to 9 times more likely to have metabolic syndrome (ie, glucose intolerance, obesity, and hypertension) than normal weight children.[6] An even higher prevalence of metabolic syndrome is found among overweight or obese Chinese children in mainland China (56%).[7] In obese children, a reduction of BMI of only 5% is associated with improvements in insulin sensitivity and lipid profiles.[8] Because many obese children will become obese adults[9] with increased susceptibility to type 2 diabetes mellitus and cardiovascular disease,[10] healthy weight management in overweight and obese children, especially among Chinese Americans, is critical.

Primary care clinics present a great opportunity for the development of feasible and effective strategies to promote healthy weight because most children receive their health care in primary care settings. Primary care clinics also provide unique opportunity to combine medical

[1]University of California San Francisco, San Francisco, CA, USA
[2]North East Medical Services, San Francisco, CA, USA

Corresponding Author:
Jyu-Lin Chen, School of Nursing, University of California San Francisco, 2 Koret Way, Box 0606, San Francisco, CA 94143-0606, USA.
Email: jyu-lin.chen@ucsf.edu

management with community outreach and improve access to health programs, especially underserved, low-income, and new immigrant populations.[11,12] Partnership with community centers or other settings where children can gain access to recreational opportunities is another important step toward developing a successful program, especially for low-income families with less available resources.[12] However, few studies have been conducted in primary care settings in collaboration with local community centers for underserved low-income immigrant children.[12,13] Therefore, we developed a culturally appropriate and evidence-based healthy weight management program (*iStart Smart*) targeting low-income Chinese immigrant children colocated at a community-based center and a primary care clinic. The purpose of the study was to explore the short-term efficacy of the *iStart Smart* program for overweight and/or obese Chinese American children and to identify factors associated with BMI changes.

Study Methodology

This study used a pretest and posttest quasi-experimental study design to test a healthy weight management intervention with overweight and/or obese Chinese American children. Children who met the following inclusion criteria were invited to participate in the study: (1) between 7 and 12 years old; (2) self-identified as Chinese and/or Chinese immigrants; (3) identified as overweight and/or obese defined by having a BMI percentile above the 85th percentile, as defined by the Centers for Disease Control and Prevention[14]; (4) lived with at least 1 parent in the same household; and (5) were able to speak and read English. In addition, the child's parents had to be able to speak English, Mandarin, or Cantonese and to read in English or Chinese. Exclusion criteria included children with chronic health problems that lead to any dietary modifications or activity limitations (eg, diabetes). Committee on Human Research approved this study.

Study Procedure

A trained research assistant worked with primary care providers in a primary care clinic on identifying and recruiting study participants. Study flyers also were also posted in the clinic. Potential eligible participants received an introduction letter sent out by the research team explaining the study. Parents who were interested in the study provided their names and contact information to the research team via mail or phone.

After parents gave informed consent and children provided verbal assent, baseline data were collected. Children in the study had their weight, height, blood pressure (BP), waist and hip circumference measured. Fast lipid data were also collected at the clinic at baseline and at 6-month postintervention. Additionally, children completed questionnaires regarding food choices, self-efficacy, and knowledge regarding nutrition and physical activity at baseline (T_0), 2 months (T_1), and 6 months (T_2) postbaseline. Several questionnaires regarding demographic data, acculturation level and child's activity level were completed by parents.

iStart Smart *Program Overview*

The description of the program has been reported elsewhere.[15] In summary, intervention was also based on social cognitive theory aimed to increase children's self-efficacy through setting realistic and achievable goals and providing necessary skills to achieve mastery. The program was intended to improve self-efficacy in maintaining a healthy weight and a healthy lifestyle.

In this study, children attended 8-weekly, 2-hour small group sessions while parents attended a single 2-hour parent workshop. The children's program included 60 minutes of interactive health curriculum and 60 minutes of physical activity each week. The program was led by a trained research assistant. A parent workshop conducted in Cantonese and English was used to discuss both Chinese and Western diets and ways to increase physical activity in urban, underresourced communities. The parent workshops aimed to increase parents' knowledge and skills regarding healthy food preparation, active lifestyle and maintaining a healthy weight tailored to the needs of each family. The program also included a field trip to a local grocery store to reinforce messages about healthy food choices.

Parental Measures

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

Acculturation: Suinn-Lew Asian Self-Identity Acculturation Scale. Suinn-Lew Asian Self-Identity Acculturation Scale (SL-ASIA) is a 21-item multiple-choice questionnaire that contains questions related to language, identity, friendships, behaviors, general and geographic background, and attitudes. The SL-ASIA has moderate to satisfactory validity and reliability for Chinese Americans.[16]

Family Eating and Activity Habits Questionnaire. The Family Eating and Activity Habits Questionnaire (FEAHQ) was used to monitor the environmental factors and family behaviors.[17] This questionnaire was completed by the parents. It assesses the behaviors of parent, spouse, and child. It contains 29 items and has 4 subscales: *activity and inactivity level subscale, stimulus exposure, eating related to hunger subscale, eating styles subscale*. Scores were calculated separately for each member of the family, with higher scores reflecting poor eating and activity/inactive behaviors. The FEAHQ has an established validity and internal consistency.[17] Activity and inactivity level subscale was used to estimate the activity change in children.

Children's Measures

Body Mass Index. Body mass index was calculated by dividing body mass in kilograms by height in meters squared (kg/m^2).[18] In this study, children's weight and height were measured while the children wore lightweight clothes and no shoes. The 214 Road Rod portable stadiometer, which has graduations of 1/8 inch (0.1 cm), were used to measure stature.

Waist-to-Hip Ratio. The waist-to-hip ratio was derived from the waist and hip circumferences. Waist circumference was measured midway between the lowest rib and the superior border of the iliac crest. Hip circumference was measured at the maximal protrusion of the buttocks. The circumferences were given as the mean of 2 measurements to the nearest 0.1 cm.[19]

Blood Pressure. Blood pressure, including 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, NY) to the nearest 2 mm Hg. BP was measured twice in the child's right arm, with the child seated after 10 minutes of rest.

Lipids Profile. Fasting sample measures included high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol, triglyceride, total cholesterol, insulin, and fasting glucose and were obtained at the clinic laboratory.[20,21] Children were asked to fast for 12 hours before samples were obtained. Blood samples were collected at baseline and at 6-month follow-up assessment.

Usual Food Choices. This 14-item survey was part of the Health Behavior Questionnaire developed for the Child and Adolescent Trial for Cardiovascular Health (CATCH) study. This survey asked about usual food choices (behavior) in a forced-choice format that focuses on low-fat and low-sodium foods. It measured usual food selections and what types of food a child eats most of the time. Children were given a choice between 2 foods and asked which one they eat more often. Sample questions are: "Which foods do you eat most of the time: hot dog or chicken? Frozen yogurt or ice cream?" A higher score indicated more healthy food choices. Adequate validity and internal consistency were reported.[22]

Physical Activity Knowledge. The research team developed this 5-item questionnaire to assess children's knowledge about physical activity. Items were adapted from recommendations from the US Department of Agriculture[23] and the American Heart Association[24] regarding dietary guideline, MyPlate, and children's health. Sample questions included the following: "How many minutes of activity are required for a healthy heart for a child? How many hours a day should a child watch television or play video games?" The score ranged from 0 to 5. A higher score indicated more accurate knowledge about physical activity needs.

Dietary Knowledge. This 14-item questionnaire was part of the Health Behavior Questionnaire developed for the CATCH study.[22] It measured children's knowledge about healthy food choices. Children were asked to identify the food that was "better for your health." Samples of 2 choices included: "whole wheat or white bread" and "frozen corn or canned corn." This survey had a reported internal consistency ranging from 0.76 to 0.78.[22] The possible score ranged from 0 to 14. A higher score indicated more accurate dietary knowledge.

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.[22] The questionnaire contained 15-item stems beginning with "How sure are you . . .?" Items were scored on a Likert-type scale, with options of "not sure," "a little sure," or "very sure." The possible score ranged from 1 to 3. Higher scores indicated higher self-efficacy. Adequate reliability has been reported for children.[25]

Physical Activity Self-Efficacy. This 5-item subscale of the Health Behavior Questionnaire was used to measure the children's self-confidence in their ability to participate in various age-appropriate physical activities.[25] The possible scores ranged from 1 to 3. Children were asked if they were "not sure," "a little sure," or "very sure" that they could complete activities such as "keeping up a steady pace without stopping for 15 to 20 minutes." Higher scores indicated higher self-efficacy. Adequate internal consistency has been reported for children.[25]

Table 1. Outcome Variable Descriptive Data, Mean (SD).

Variable	T_0	T_1	T_2
BMI	23.7 (3.6)	23.4 (3.5)	23.4 (3.8)
BMI percentile	93.9 (8.1)	93.5 (8.3)	92.7 (8.3)
Waist/hip ratio	0.95 (0.09)	0.94 (0.09)	0.92 (0.05)
Systolic BP	104.0 (8.8)	99.8 (10.9)	101.1 (8.9)
Diastolic BP	62.7 (8.3)	59.1 (11.1)	61 (1.06)
HDL	47.83 (10.39)		50.94 (10.24)
LDL	101.92 (34.23)		100.69 (36.29)
Total cholesterol	169.36 (38.38)		166.19 (41.32)
Triglyceride	97.25 (59.02)		72.92 (48.29)
Glucose	85.89 (5.24)		85.52 (6.21)
Food choice	9.02 (2.35)	9.66 (2.13)	9.38 (2.09)
Nutrition knowledge	9.37 (2.39)	9.72 (2.13)	9.61 (2.10)
PA knowledge	3.19 (1.67)	3.68 (1.48)	3.63 (1.67)
Nutrition self-efficacy	2.37 (.48)	2.53 (.39)	2.51 (.42)
PA self-efficacy	2.25 (.47)	2.32 (.44)	2.37 (.42)
Child activity/inactivity	2.11 (7.35)	−1.11 (10.75)	−4.12 (14.20)
Stimulus exposure	8.79 (3.27)	8.20 (3.64)	8.39 (4.3)
Eating related to hunger subscale: Child	6.52 (2.42)	6.15 (2.07)	6.21 (2.01)
Eating styles subscale: Child	18.52 (6.92)	17.66 (6.07)	16.46 (7.27)

Abbreviations: BMI, body mass index; BP, blood pressure; HDL, high-density lipoprotein; LDL, low-density lipoprotein; PA, physical activity.

Data Analysis

Descriptive statistics were calculated for demographic characteristics and all major study variables. To assess the potential efficacy of the intervention, mixed-effect models were used to estimate average pre- and post-changes in BMI, usual food choices, child's health behaviors, health knowledge, and self-efficacy. Outcomes from baseline, 2-month, and 6-months post-baseline visits were included as repeated measures, using a random effect for each child to account for within-subject correlation of the outcomes. Age and gender were included as covariates in all models. Paired *t* test was used to examine the change of lipid profile at baseline and at 6-month follow-up assessment.

To examine factors associated with change of child's BMI, stepwise linear regression with stepwise was used. Variables included in the model were child's usual food choice, child's activity, family stimulus environment, child's eating related to hunger, child's eating style, child's nutrition knowledge, physical activity knowledge, self-efficacy related to nutrition and physical activity. All analyses were performed using SPSS 22.0, with $P < .05$ set as the required level of significance.

Results

A total of 115 children participated in the program. Children had a mean age of 9.5 years (SD = 1.53), average BMI of 23.7 kg/m^2 (SD = 3.56) and average BMI percentile is 94 (SD = 8.06). Approximately 70% of children in the *iStart Smart* program were boys (n = 81). The average education level for mothers in the study is 10.5 years (SD = 3.5 years) and father is 10.7 years (SD = 2.91 years). The mean acculturation score was 2.05 (SD = 0.56), indicating a low acculturation population. About 80% of families in the study reported annual household income less than $40 000. The attendance rate was at 90% with a retention rate of 95% at the 6-month follow-up. Data on outcome variables are presented in Table 1.

iStart Smart *Efficacy Outcomes*

We found significant reduction of BMI ($t = −3.20$, $P = .002$), waist/hip ratio ($t = −4.29$, $P = .001$), SBP ($t = −2.52$, $P = .013$) and improvement of child's eating style ($t = −3.30$, $P = .01$), physical activity knowledge ($t = 2.01$, $P = .04$), physical activity self-efficacy ($t = 2.57$, $P = .011$), child's dietary self-efficacy ($t = 3.91$, $P = .001$), and children's quality of life ($t = 3.44$, $P = .001$) at 6-month postbaseline assessment (Table 2). In addition, significant improvement of *HDL* cholesterol ($t = −2.94$, $P = .006$) and decrease in triglyceride ($t = 3.41$, $P = .002$) were found at 6-month postbaseline assessment.

Factors Associated With BMI change

Regression analysis revealed improvement of nutrition self-efficacy and decreased stimulus environment were

Table 2. Summary of Effects of the *iStart Smart* Intervention.

Outcome	Estimate	t	P	95% CI
BMI[a]	−0.08	−3.20	.002	−0.14, −0.03
BMI percentile	−0.19	−1.42	.16	−0.44, 0.07
Waist/hip ratio[a]	−0.008	−4.29	.0001	−0.01, −0.005
Systolic BP[a]	−0.67	−2.52	.013	−1.20, −0.14
Diastolic BP	−0.42	−1.45	.18	−1.00, 0.15
FEAHQ child activity	−1.13	−3.39	.001	−1.78, −0.47
FEAHQ stimulus	0.05	0.65	.52	−0.11, 0.29
FEAHQ child eating–hunger	−0.04	−0.10	.48	−0.15, 0.07
FEAHQ child eating style[a]	−0.52	−3.30	.01	−0.84, −0.21
Food choice	0.11	1.50	.14	−0.03, 0.25
PA knowledge[a]	0.07	2.01	.04	0.001, 0.14
Nutrition self-efficacy[a]	0.04	3.91	.001	0.02, 0.06
Activity self-efficacy[a]	0.03	2.57	.011	0.007, 0.06
PQOL	1.44	3.44	.001	0.61, 2.27

Abbreviations: BMI, body mass index; BP, blood pressure; FEAHQ, Family Eating and Activity Habits Questionnaire; PA, physical activity; PQOL, perceived quality of life.
[a]Significant change.

Table 3. Body Mass Index Linear Regression Summary.

Outcome	Predictor(s)	R^2	B	sr^2	F	P
BMI	Overall	.40			6.06	.01
	Nutrition self-efficacy		−2.05	.36	11.97	.003
	Stimulus		0.17	.04	9.93	.045

associated with decreased BMI in overweight and obese Chinese American children in the study (F = 6.06, P = .01; see Table 3).

Discussion

The study found that a culturally appropriate and evidence-based health weight management program colocated at a community-based center and a primary care clinic demonstrated short-term efficacy. At 6-month follow-up, children in the program decreased their BMI, SBP, and triglyceride and increased HDL. In addition, improvement of child's eating style, physical activity knowledge, physical activity self-efficacy, and children's quality of life was also found at 6-month follow-up. Improvement of child's dietary self-efficacy and decreased stimulus for unhealthy food at home were associated with decreased child's BMI.

The lifestyle intervention we employed while partnered with community organizations in primary care settings revealed significant reduction in BMI and improvement in lipids at 6-month follow-up among overweight and/or obese Chinese American children. Our intervention focuses on healthy lifestyle behavior change and the program is tailored to low-income Chinese American immigrants. Results of our study were consistent with systematic review articles suggest that behavioral lifestyle interventions (ie, improved health diet, increased physical activity, decreased sedentary activity, and less sugar-sweetened beverages) can lead to improvements in weight and metabolic outcomes in children.[26,27]

Comprehensive group lifestyle programs have both been found to be effective in primary care settings as many children receive health care in primary care clinics.[28] In addition, a recent systematic review on the effects of primary care intervention on childhood overweight and obesity found that 47% of studies (8 of 17) reported significant anthropometric changes immediately after the intervention, and all maintained some significant effect at subsequent follow-up (between 4 months and 4 years after intervention).[29] Our study supports the notion that lifestyle intervention can lead to behavior and weight change, and the primary care clinic is a feasible setting at least in short term.

Our study found improvement of child's dietary self-efficacy and decreased stimulus for unhealthy food at home were associated with BMI reduction among overweight and/or obese Chinese American children. As the study was based on social cognitive theory and the intervention aimed to increase children's self-efficacy through various activities related to goal setting and skill building to promote a healthy lifestyle and to maintain a healthy weight, improvement of diet self-efficacy leads to decrease BMI. This was consistent with other studies that support the notion of increased self-efficacy is associated with BMI reduction.[30-32]

In addition to improving self-efficacy for diet, we also found decreased presence of unhealthy food at home also related to decreased BMI. Family environment and parents' health behaviors are key influences on the development of children's food preferences, eating styles, and activity patterns.[33-36] Several studies have shown that childhood obesity prevention programs can be effective when they are designed to include parents in behavior change and home environments, where they can engage children to change their dietary behavior, decrease sugary drinks, increase physical activity, and reduce television viewing time.[37-40] Parents in this study learned various strategies to improve their health by promoting a healthy home environment and engage in healthy lifestyle practices with their children. Our study found that removal of unhealthy food (stimulus environment) at home helped reduce BMI in overweight and/or obese children.

Healthy People 2020 has listed reducing childhood obesity as our national health priority. Many families with overweight and/or obese children have been looking for effective healthy weight management program for their children. The partnership between primary care clinics and community centers increases access and resources for these families. Our intervention provides a first insight into a culturally appropriate and evidence-based healthy weight management intervention in overweight and obese Chinese American children in low-income families.

Despite the short-term efficacy on weight management in overweight and obese children, this study has some limitations, including (1) convenience sampling, (2) nonrandomization design, (3) only involved Chinese American children, and (4) follow-up for only 6 months. Furthermore, we only assessed the short-term efficacy of the intervention in this study. Future studies will have better generalizability if they included larger and more diverse samples, and longer periods for follow-ups with a randomized control study design. Despite the study's limitations, the results provided new information on healthy weight management in the primary care setting in a low-income community.

Author Contributions

JLC contributed to the design of the intervention, data analysis and manuscript preparation.MKcontributed to participant recruitment, design of the intervention and manuscript preparation.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

1. Au L, Kwong K, Chou JC, Tso A, Wong M. Prevalence of overweight and obesity in Chinese American children in New York City. *J Immigr Minority Health*. 2009;11:337-341.
2. Stevens J. Ethnic-specific revisions of body mass index cutoffs to define overweight and obesity in Asians are not warranted. *Int J Obes Relat Metab Disord*. 2003;27:1297-1299.
3. Stevens J, Truesdale KP, Katz EG, Cai J. Impact of body mass index on incident hypertension and diabetes in Chinese Asians, American Whites, and American Blacks: the People's Republic of China Study and the Atherosclerosis Risk in Communities Study. *Am J Epidemiol*. 2008;167:1365-1374.
4. Garnett SP, Baur LA, Srinivasan S, Lee JW, Cowell CT. Body mass index and waist circumference in midchildhood and adverse cardiovascular disease risk clustering in adolescence. *Am J Clin Nutr*. 2007;86:549-555.
5. Cheung GW, Lau RS. Testing mediation and suppression effects of latent variables: bootstrapping with structural equation models. *Organ Res Methods*. 2008;11:296-325.
6. Navder KP, He Q, Zhang X, et al. Relationship between body mass index and adiposity in prepubertal children: ethnic and geographic comparisons between New York City and Jinan City (China). *J Appl Physiol*. 2009;107:488-493.
7. Li YP, Yang XG, Zhai FY, et al. Disease risks of childhood obesity in China. *Biomed Environ Sci*. 2005;18:401-410.
8. Savoye M, Shaw M, Dziura J, et al. Effects of a weight management program on body composition and metabolic parameters in overweight children: a randomized controlled trial. *JAMA*. 2007;297:2697-2704.
9. Rademacher ER, Jacobs DR Jr, Moran A, Steinberger J, Prineas RJ, Sinaiko A. Relation of blood pressure and body mass index during childhood to cardiovascular risk factor levels in young adults. *J Hypertens*. 2009;27:1766-1774.
10. Lloyd LJ, Langley-Evans SC, McMullen S. Childhood obesity and risk of the adult metabolic syndrome: a systematic review. *Int J Obes (Lond)*. 2012;36:1-11.
11. Jacobson D, Gance-Cleveland B. A systematic review of primary healthcare provider education and training using the Chronic Care Model for childhood obesity. *Obes Rev*. 2011;12:e244-e256.
12. Duggins M, Cherven P, Carrithers J, Messamore J, Harvey A. Impact of family YMCA membership on childhood

obesity: a randomized controlled effectiveness trial. *J Am Board Fam Med*. 2010;23:323-333.
13. Dolinsky DH, Armstrong SC, Walter EB, Kemper AR. The effectiveness of a primary care-based pediatric obesity program. *Clin Pediatr (Phila)*. 2012;51:345-353.
14. Centers for Disease Control and Prevention. Childhood obesity. 2007. http://www.cdc.gov/growthcharts/clinical_charts.htm Accessed August 2007.
15. Chen JL, Kwan M, Mac A, Chin NC, Liu K. iStart Smart: a primary-care based and community partnered childhood obesity management program for Chinese-American children: feasibility study. *J Immigr Minor Health*. 2013;15:1125-1128.
16. Suinn RM. Measurement of acculturation of Asian Americans. *Asian Am Pac Isl J Health*. 1998;6:7-12.
17. Golan M, Weizman A. Reliability and validity of the Family Eating and Activity Habits Questionnaire. *Eur J Clin Nutr*. 1998;52:771-777.
18. Freedman DS, Perry G. Body composition and health status among children and adolescents. *Prev Med*. 2000;31:34-53.
19. McCarthy HD. Measuring growth and obesity across childhood and adolescence. *Proc Nutr Soc*. 2014;73:210-217.
20. Chen J, Weiss S, Heyman MB, Vittinghoff E, Lustig R. Pilot study of an individually tailored educational program by mail to promote healthy weight in Chinese American children *J Spec Pediatr Nurs*. 2008;13:212-222.
21. Vuguin R, Saenger P, Dimartino-Naidj J. Fasting glucose insulin ratio: a useful measure of insulin resistance in girls with premature adrenarche. *J Clin Endocrinol Metab*. 2001;84:4618-4621.
22. Edmundson E, Parcel GS, Feldman HA, et al. The effects of the Child and Adolescent Trial for Cardiovascular Health upon psychosocial determinants of diet and physical activity behavior. *Prev Med*. 1996;25:442-454.
23. Steps to a healthier you. 2006. http://www.choosemyplate.gov/food-groups/downloads/resource/MyPyramidBrochurebyIFIC.pdf. Accessed January 1 2015.
24. American Heart Association, ed. *Children's Health*. Dallas, TX: American Heart Association; 2006.
25. Matheson DM, Killen JD, Wang Y, Varady A, Robinson TN. Children's food consumption during television viewing. *Am J Clin Nutr*. 2004;79:1088-1094.
26. Hox JJ. *Multilevel Analysis: Techniques and Applications*. 2nd ed. New York, NY: Routledge; 2010.
27. Iacobucci D, Saldanha N, Deng X. A meditation on mediation: evidence that structural equations models perform better than regressions. *J Consumer Psychol*. 2007;17:139-153.
28. Wang Y, Lim H. The global childhood obesity epidemic and the association between socio-economic status and childhood obesity. *Int Rev Psychiatry*. 2012;24:176-188.
29. Sargent GM, Pilotto LS, Baur LA. Components of primary care interventions to treat childhood overweight and obesity: a systematic review of effect. *Obes Rev*. 2011;12:e219-e235.
30. Chen JL, Weiss S, Heyman MB, Cooper B, Lustig RH. The efficacy of the web-based childhood obesity prevention program in Chinese American Adolescents (Web ABC Study). *J Adolesc Health*. 2011;49:148-154.
31. Chen JL, Weiss S, Heyman MB, Lustig RH. Efficacy of a child-centred and family-based program in promoting healthy weight and healthy behaviors in Chinese American children: a randomized controlled study. *J Public Health (Oxf)*. 2010;32:219-229.
32. Wilson J, Latimer A, Meloff L. Correlates of changes in a childhood obesity treatment program. *J Clin Outcomes Manage*. 2001;8:9-10.
33. Birch LL, Davison KK. Family environmental factors influencing the developing behavioral controls of food intake and childhood overweight. *Pediatr Clin North Am*. 2001;48:893-907.
34. Kral TV, Rauh EM. Eating behaviors of children in the context of their family environment. *Physiol Behav*. 2010;100:567-573.
35. Bruss MB, Morris J, Dannison L. Prevention of childhood obesity: sociocultural and familial factors. *J Am Diet Assoc*. 2003;103:1042-1045.
36. Fisher JO, Mitchell DC, Smiciklas-Wright H, Birch LL. Parental influences on young girls' fruit and vegetable, micronutrient, and fat intakes. *J Am Diet Assoc*. 2002;102:58-64.
37. Branscum P, Sharma M. A systematic analysis of childhood obesity prevention interventions targeting Hispanic children: lessons learned from the previous decade. *Obes Rev*. 2011;12:e151-e158.
38. Bond M, Wyatt K, Lloyd J, Taylor R. Systematic review of the effectiveness of weight management schemes for the under fives. *Obes Rev*. 2011;12:242-253.
39. Kamath CC, Vickers KS, Ehrlich A, et al. Clinical review: behavioral interventions to prevent childhood obesity: a systematic review and metaanalyses of randomized trials. *J Clin Endocrinol Metab*. 2008;93:4606-4615.
40. West F, Sanders MR, Cleghorn GJ, Davies PS. Randomised clinical trial of a family-based lifestyle intervention for childhood obesity involving parents as the exclusive agents of change. *Behav Res Ther*. 2010;48:1170-1179.