A Community Clinic-based Approach to Address Pediatric Obesity among a Predominantly Latino Sample of Youth Enrolled in a State Health Plan

Jie W. Weiss[1], Melina H. Yepiz[1], Michele Mouttapa[1], Shari McMahan[1], and Alberto Gedissman[2]

[1]*California State University, Fullerton*
[2]*AltaMed Health Services*

Abstract

Background and Purpose: Comprehensive weight management interventions with family involvement are effective in reducing obesity among children and youth. This prospective cohort study examined whether youth who participated in a clinic-based, culturally-sensitive pediatric weight management intervention experienced reductions in BMI percentile, percent body fat, and waist circumference, from baseline to the end of the program.

Methods: Participants included 240 children and youth (61.3% male) between ages 5 to 18 years (Mean age= 12.8 $\pm$ 3.7 years), and nearly all of them were of Latino race/ethnicity. All participants were clinically diagnosed as overweight or obese and were referred to participate in the eight-week intervention, which included standard medical consultations, psychological counseling, and physical activity sessions for the youth participants, and nutrition education for their parents. Participants completed baseline and end-of-the-program assessments.

Results: Participants experienced significant decreases in BMI percentile and body fat percentage after adjusting for growth in height. Older children were more likely to experience decreases in waist circumference relative to younger children.

Conclusion: This study suggests that a clinic-based, culturally sensitive intervention may effectively reduce indicators of obesity among youth in predominantly Latino communities, beyond changes in these indicators due to normal growth.

Keywords: body mass index percentile, percent body fat, waist circumference, and obesity, pediatric weight management intervention program, Latino youth

Introduction

Childhood obesity is a significant public health concern in the U.S. that has reached epidemic proportions (Ogden, Carroll, Kit, & Flegal, 2014). From 1980 to 1992, rates of childhood obesity has doubled among children ages 6-11 years, and has quadrupled among youth ages 12-19 years (Ogden et al., 2014; United States Department of Health and Human Services, 2012). Obesity is associated with cardiovascular health conditions such as hypertension (Freedman, Zuguo, Srinivasan, Berenson, & Dietz, 2007), pre-diabetes and type-2 diabetes (Centers for Disease Control and Prevention, 2011), as well as pulmonary conditions such as asthma (Black, Zhou, Takayanagi, Jacobsen, & Koebnick, 2013). Research demonstrates that obesity status in childhood and adolescence may continue into adulthood and increase the risk of chronic diseases (Freedman, Mei, Srinivasan, Berenson, & Dietz, 2007).

Childhood obesity is disproportionally affecting minority communities in the United States, and one of the most affected minority groups are Latino/Hispanics (Ogden et al., 2014; Ogden, Carroll, Kit, & Flegal, 2012; U.S. Preventive Services Task Force, 2010). California Health Interview Survey (CHIS) results suggest that Hispanic children and youth were the ethnic group with the second highest risk of being overweight (Allen et al., 2007; Berelowitz, 2010). Previous studies suggest that comprehensive weight management interventions with family involvement are

effective in promoting physical activity and healthier nutrition, and obesity reduction among children and youth (Dreimane et al., 2006; Savoye et al., 2007; Wilfley et al., 2007). However, evidence on the effectiveness of clinic-based obesity interventions among youth residing in low income primarily Latino communities is still limited, as many obesity prevention approaches targeting youth are implemented in the school setting, with less parental involvement (Dreimane et al., 2006; Savoye et al., 2007; U.S. Preventive Services Task Force, 2010).

Overweight and obesity is determined by calculating the Body Mass Index (BMI = kg/m^2) for adults and BMI percentile for children and adolescents. While BMI percentile is the most common measurement of childhood overweight and obesity, research demonstrates the benefit of utilizing multiple measurements of obesity (Krebs et al., 2007; Gundersen, Garasky, & Lohman, 2009). For this reason, the present study assessed additional indicators of obesity, specifically percent body fat and waist circumference. Furthermore, a decrease in overweight and obesity status is often observed among children and adolescents during the pubertal maturation stage as they grow taller (Killeen, Vanderburg, & Harlan, 1978; He & Karlberg, 2001; Freedman et al., 2004). For this reason, analyses in the present study adjusted for changes in height from pre-test to post-test.

The Present Study

This preliminary study investigated changes in obesity-related outcomes for primarily underserved low-income youth in a predominantly Latino community. The obesity intervention was an eight-week program that consisted of standard medical consultations, psychological counseling, nutrition classes, and physical activity. The program was culturally sensitive, in that all staff members were also Latinos who spoke fluent Spanish. We expected that BMI percentile, percent body fat, and waist circumference would significantly decrease from baseline to the end of the eight-week program.

Methods

Participants

The majority of the participants were enrolled in state and federal health plans. They were referred for care to the Wellness Center in Orange County, California, by medical professionals affiliated with the County Medicaid plan that serves low income residents. The Wellness Center is a self-standing unit dedicated to prevention and treatment of pediatric and adolescent obesity. The eligibility requirements for the study included that participants were between 5 and 18 years of age. Participants could not have co-morbidities including diabetes, hypertension or severe developmental disabilities. In addition, every child or adolescent had to be clinically diagnosed as overweight or obese based on Center of Disease Control and Prevention guidelines (CDC, 2010). Data from this study were from patients seen at the Wellness Center between 2007 and 2008. Complete psychosocial and anthropometric data was collected from 374 patients at baseline. Of these 374 participants, 240 (64.2%) completed the eight-week intervention program and the end-of-the-program assessment. Hence, the analyses presented in this study were conducted on those 240 participants. The sample primarily consisted of Latino children and adolescents from recent immigrant, low income families. Patients' visits were covered by their medical plan. Those who completed the intervention and the end-of-program assessment did not differ from those who dropped out of the program on age, BMI percentile, percent body fat, and waist circumference. However females were more likely to drop out of the program (41.9%) compared to males (28.4%).

Intervention

The intervention followed recommendations from the 200 Expert Guidelines developed by a multidisciplinary workgroup that focused on establishing consensus on the best practices for childhood obesity prevention (Hassink, Hill, & Biddinger, 2011). The program was developed at the Wellness by the program director, a pediatrician, and his team (consisting of a psychologist, a nutritionist, a fitness trainer, a

program coordinator, and office staff). The intervention was culturally sensitive in that all staff were bilingual (English and Spanish) and of a Latino/Hispanic cultural background, and that parents' nutrition education sessions included discussions about foods that are commonly eaten in their culture. Furthermore all materials provided to the parents and youth (e.g., literature, consent forms, and surveys) were provided both in English and Spanish.

The intervention was eight weeks in duration, and included medical examinations, family counseling, and physical activity sessions for the participants, and nutrition education classes for their parents. 1) *Medical Consultation*. A pediatrician conducted an initial comprehensive medical examination, including extensive laboratory evaluation of co-morbidities, medical/family history assessments, and diagnoses of obesity-related co-morbidities. The patients were examined weekly by the physician followed by another comprehensive examination at the end of eight weeks. The weekly assessments included height, weight, percent body fat, and waist circumference measurements. 2) *Counseling.* A licensed psychologist provided behavioral group counseling twice during the eight-week intervention. Each session addressed emotional problems and perceived barriers associated with weight management. The groups consisted of 10-12 people, including the participant, their parents and any additional family member in the household. 3) *Nutrition Education Class.* A Registered Dietician developed a culturally appropriate curriculum to increase parents' knowledge about nutrition, food labeling, and preparation of healthy foods. The parent nutrition classes were facilitated in both English and Spanish, pamphlets and brochures were also available in both languages and the food items and recipes chosen included those of the Latino culture. The parent nutrition classes were one hour long once a week during the eight-week intervention. 4) *Physical Activity*. A certified fitness expert designed age appropriate activities and exercises tailored to the current physical abilities and tolerance levels of overweight and obese youth. Guidance and actual exercises that followed the guidelines for the Presidential Fitness Test and the California Board of Education FitnessGram were incorporated in the physical activity program. Participants engaged in a one hour PA session every week for eight weeks while their parents attended the nutrition class.

Measurements

BMI Percentile. Height and weight were measured to calculate BMI and BMI percentile. The children's height was measured without them wearing shoes, using a portable stadiometer. Weight was obtained using a digital calibrated portable scale. The students were weighed without their shoes and without wearing sweat shirts/sweaters/jackets. BMI was calculated using the following equation: weight (kg) / [height (m)]^2. BMI percentile is commonly used to assess the size and growth patterns in children and adolescents 2 to 19 years old. BMI percentile indicates the relative position of the child's BMI index among children of the same sex and age. BMI percentile was calculated by plotting the BMI value on growth charts for each child's age and sex (US Preventive Services Task Force, 2010). Overweight is defined as a BMI $\geq$ 85th percentile that is < 95th percentile and obesity is defined as a BMI $\geq$ 95th percentile (CDC, 2009).

Percent Body Fat. Percent body fat is an effective indicator of overweight and obesity (Poirier, 2007). In this study, percent body fat was measured through an impedance electronic scale. Impedance electronic scales deliver small electrical currents through the individual when he or she steps on the scale. Body fat percentage is determined by the speed at which the current passes through the body, as the current passes more slowly through fat relative to muscle.

Waist Circumference. Waist circumference was measured by locating the upper hipbone and the top of the iliac crest. Then, a gulick measuring tape was placed horizontally around the abdomen at the iliac crest level, and was measured to the nearest tenth of a centimeter at the end of a normal exhalation (Ford, Mokdad, & Ajani, 2004).

Background Characteristics. The parents or family member(s) who brought the child to the study site completed a baseline questionnaire that contained background characteristics. Such variables included ethnicity (for which a blank space was provided for participants to provide the answer), child's gender, and parent's level of education (less than grade school, grade school, high school, two years of college, college graduate, and professional degree). Furthermore, parents were asked to report the number of days their child engaged in at least 60 minutes of aerobic activity in the past week. It is recommended that children and adolescents to engage in 60 minutes of physical activity per day (CDC, 2015; Iannotti, & Wang, 2013). The response options were "6-7 days," "5 days," "4 days," "3 days," "2 days," "1 day" and "Do not exercise."

We also assessed sedentary behaviors related to computer and television use. Specifically we asked, "Indicate the number of hours in the week your child spends on the computer and/or television, computer games, chat online or messaging." The response options were "greater than 5 hours," "4 hours," "3 hours," "2 hours," "1 hour," "less than 1 hour," and "0 hours." Computer and television viewing are associated with physical inactivity and obesity (Jordan, & Robinson, 2008). The recommendation by the American Academy of Pediatrics is "no more than 2 hours" of total screen time, TV, computer, videos games, etc. a day for children (AAP, 2001).

Procedures

Permission to analyze the existing data was granted by the Institutional Review Board of California State University, Fullerton, and by the director of the Wellness Center. However prior to participating in the study, parents provided written informed consent which expressed their permission to utilize their child's de-identified data for research-related purposes. All data were collected at the clinic site. Parents completed a baseline demographic questionnaire at the clinic site; medical examination data were collected at baseline and at the end of the eight-week program, while under the supervision of trained staff.

Data Analysis

Statistical analysis was performed using SPSS 18.0. Descriptive statistics were performed on the demographic variables of interest. Specifically, frequencies and percentages were calculated for weight category, ethnicity, gender, parental level of education, weekly physical activity, and weekly computer/television use. Means and standard deviations were calculated for BMI percentile, percent body fat, and waist circumference, at baseline and at the end of the eight-week program.

Paired samples t-tests were calculated to determine whether BMI percentile, percent body fat, and waist circumference significantly changed between baseline and the end of the program. Next, repeated measures of analyses of variance (ANOVAs) were run, adjusting for covariates that were significantly associated with changes in the outcome variables.

Results

A total of 374 participants enrolled in the program and completed baseline assessments. Of them, 240 remained in the eight-week program and completed the end-of-program assessments. These 240 participants consisted Latino children and youth (61.3% male) between 5 to 18 years of age (mean age= 12.8 $\pm$ 3.7 years). They constituted the analytic sample for this study, with the exception of gender, the analytic sample did not differ from those lost to follow-up on any of the outcome variables or demographic characteristics. A higher proportion of females (42.5%) dropped out of the program relative to males (30.3%; $p < .05$).

Background Characteristics

Table 1 presents background characteristics of the analytic sample. The majority was male (61.3%), Mexican American (82.9%), and obese (95.4%). All but 8 of the participants (96.7%) were not hypertensive. Mean age of the child in the program was 12.8 $\pm$ 3.7 years. Physical activity levels varied considerably across the sample, with the most common response being "3 times per week" (15.4%). For the sedentary activity question, the most common response was that children watched a computer or

television screen at least five hours per week (27.1%).

Table 1.

Baseline Characteristics of the Analytic Sample (n=240)

Demographic Characteristics	n (%)
Child's Gender (Male)	147 (61.3)
Child's Ethnicity	
Mexican American	199 (82.9)
Other Hispanic	12 (5.0)
Other	9 (3.8)
Asian	5 (2.1)
African American	1 (0.4)
Parental Education	
Completed grade School	61 (25.4)
High School	65 (27.1)
Two years of College	19 (7.9)
Graduated College	8 (3.3)
Graduated Professional School	7 (2.9)
	M ± SD
Child's Age	12.8 ± 3.7

Obesity-Related Characteristics	n (%)
Child's Weight Status	
Overweight	11 (4.6)
Obese	229 (95.4)
Child's Baseline SBP (Hypertensive)	8 (3.3)
Physical Activity (days/week)	
0	33 (13.8)
1	25 (10.4)
2	22 (9.2)
3	37 (15.4)
4	28 (11.7)
5+	36 (15.0)
Sedentary Activity (hours/week watching TV/ other electronic device)	
0	23 (9.6)
1	20 (8.3)
2	31 (12.9)
3	43 (17.9)
4	31 (12.9)
5+	65 (27.1)

Note. Frequencies for a given variable do not necessarily add up to the total sample size of 240 due to missing data.

Changes in Outcome Variables

Table 2 presents changes in BMI percentile, percent body fat, and waist circumference from baseline until the end of the eight-week intervention. Paired samples t-test results indicated that participants on average decreased their BMI percentile by over 1 percentile point ($p < .001$), decreased their body fat by over 2.5% ($p < .001$)and decreased their waist circumference by nearly one inch ($p < .001$).

Table 2.

Summary of Obesity Indicators

	BMI Percentile (n = 240)	Percent Body Fat (n = 218)	Waist Circumference (n = 232)
	Mean (± SD)	Mean (± SD)	Mean (± SD)
Baseline	98.91 ± 2.25	36.94 ± 11.15	38.36 ± 6.11
End of Program	97.72 ± (3.37)	34.20 ± 10.78	37.45± 5.93
	t (p)[1]	t (p)[1]	t (p)[1]
	9.10 (<.001)	8.69 (<.001)	8.79 (<.001)

[1]Test statistic and p-value for paired samples t-test results.

Finally, repeated measures of analyses of variance were conducted to determine whether these changes in outcome variables remained significant after adjusting for covariates (see Table 3). We found that decreases in BMI percentile remained significant ($p < .001$), after adjusting for growth in height from baseline to the end of the program. Furthermore, Pearson's correlation coefficient results revealed that increased growth in height during this time period was associated with further reductions in BMI percentile ($r = -.15$, $p = .02$). Similarly, reductions in percent body fat were statistically significant after adjusting for growth in height ($p < .001$). Pearson's correlation coefficient results also revealed that increased growth was associated with further reductions in percent body fat ($r = -.14$, $p = .03$). After adjusting for age, we found that changes in waist circumference varied by age. Pearson's correlation coefficient results revealed that increased age was associated with further reductions in waist circumference ($r = -.23$, $p < .001$).

Table 3.

Summary of F ratios for Repeated Measures ANOVA (n= 240)

	F (p)
Change in BMI Percentile	52.05 (<.001)
BMI Percentile x Change in Height[1]	5.53 (.02)
Change in Percent Body Fat	47.91 (<.001)
Body Fat % x Change in Height[1]	4.64 (.03)
Change in Waist Circumference	0.98 (.32)
Waist Circumference x age	12.60 (<.001)

[1]Change in height was growth in inches from baseline to the end of the program. Pearson's correlation coefficient results revealed that increased growth was associated with further reductions in BMI percentile ($r = -.15$, $p = .02$).

[2] Pearson's correlation coefficient results revealed that increased growth was associated with further reductions in percent body fat ($r = -.14$, $p = .03$).

[3] Pearson's correlation coefficient results revealed that increased age was associated with further reductions in waist circumference ($r = -.23$, $p < .001$).

Discussion

This study was designed to address the need for comprehensive and multidisciplinary childhood obesity intervention programs and evaluation of intervention programs targeting ethnic minorities; specifically a sample of predominantly Latino southern Californian children and youth. We examined the effectiveness of a weight management intervention program based on the reduction obesity measures such as BMI percentile, percent body fat, and waist circumference, after statistically adjusting for growth in height.

The results of this study indicated that participants' BMI percentiles significantly decreased after an eight-week intervention program compared to that of baseline even after adjusting for growth. Participants' body fat percentage also decreased significantly during the eight- week intervention. This is an encouraging finding since studies suggest that percent body fat is a more valid indicator of overweight and obesity status in children and adolescents compared to BMI (Field et al., 2003; Poirier, 2007). Previous research suggests that across genders, all racial/ethnic groups, and age groups, the waist circumferences and waist to height ratios among U.S. children have steadily increased (Tybor, Lichtenstein, Dallal, & Must, 2008; Ashwell & Shieh, 2005). Our study findings also revealed that the older youth were more likely to experience weight circumference reductions. This finding is particularly important, since rates of obesity rise sharply among youth ages 12-19 years (Ogden et al., 2014; United States Department of Health and Human Services, 2012).

Although the analysis for this study was limited to an eight-week intervention period, the changes in the obesity measurements were promising, given that the components of nutrition, physical activity, and counseling were provided only once a week. Dremaine and colleagues (2006) conducted an eight-week intervention with a majority Latino youth sample of similar age as this study, with significant results. A possible reason for our significant findings is the intervention consisted of several components (e.g., nutrition education for parents, physical activity for children, sedentary behavior reduction, family counseling, and partnership development between the primary caregiver and family) that have been effective in previous weight management studies (Epstein et al., 2012; Quattrin et al., 2012; Young, Northern, Lister, Drummond, & O'Brien, 2007; Zwiauer, 2000). These findings in the literature, combined with the findings of the present study, suggest that interventions as brief as eight weeks with the aforementioned components may result in significant obesity outcomes among children and youth.

Our findings provide preliminary evidence regarding the feasibility of administering an obesity prevention/intervention program in a pediatric clinic that is located in and serves low income communities that are predominantly Latino/Hispanic. Factors that may have contributed to the feasibility of the intervention included the proximity of the clinic to participants' homes, bilingual staff of the same culture, and written materials with Spanish translation. It has been suggested that interventions which take participants' culture into consideration are more efficacious than those where participants' culture is not taken into consideration (Epstein et al., 2012; Quattrin et al., 2012; Williamson et al., 2012). An area of improvement that is worth noting is the retention of girls in the intervention, as girls dropped out of the program at higher rates compared to boys. In their review, Bailey, Wellard, and Dismore (2005) suggest that girls' participation in physical activity significantly drops relative to their male peers at the onset of adolescence, with perceived barriers including competing interests (e.g., a higher priority in more traditionally "feminine" behaviors such as not getting sweaty). Additional efforts are needed to identify strategies that can be incorporated into the intervention described in our study, to increase retention rates among female participants

Our baseline findings indicated that the majority of the study participants were not engaging in physical activity on a daily or near-daily basis.

These results are consistent with previous studies reporting that many children and adolescents do not meet the recommendation of at least 60 minutes of moderate to vigorous physical activity per day (Ford et al., 2004; Strong et al., 2005; Nader, Bradley, Houts, McRitchie, & O'Brien, 2008). A previous study utilizing the same dataset analyzed in this study found that our intervention can be equally effective at reducing obesity indicators across all participants, regardless of their initial level of physical activity (Weiss, Mouttapa, Nacpil, Rubin, & Gedissman, 2012). Previous studies suggest that residents of lower income communities do not engage in enough physical activity because of safety concerns and a lack of access to parks and open spaces to engage in physical activity (Kumanyika, 2008). It is possible that the intervention described in this study facilitated easier access to physical activity.

Limitations

First, the study sampled a population of Hispanic/Latino children and youth living in southern California. Hence the results of the study may not generalize as well to youth from other racial/ethnic groups, other geographic regions, and higher income populations. In addition, our findings may not generalize as well to participants who have medical conditions like diabetes, hypertension, and developmental disabilities. Our participants were screened to not have these conditions. Nonetheless, the Wellness Center's weight management intervention demonstrated significant results.

Second, data for physical activity and sedentary activity levels were based on self-report questionnaires completed by the parents and the participants. Therefore, caution is needed to interpret self- reported data. Also, the response options for the sedentary activity variable did not allow us to determine which children met AAP guidelines for sedentary activity levels, which allow for 14 hours/week of sedentary activity (AAP, 2001). However, our intent was to simply identify variations in sedentary activity levels in our sample.

Finally, due to a lack of resources, this study did not have a control group. Therefore we were not able to definitively determine whether our significant findings were due to the intervention itself, or other factors that are not necessarily related to the intervention.

Conclusion

This study provided preliminary evidence that youth experienced reductions in indicators of obesity by participating in a comprehensive and clinic-based program. Consistent with previous studies, this study demonstrated that an obesity intervention that is culturally sensitive and utilizes multiple components may be a feasible and effective strategy among children and youth in predominantly Latino communities. Due to the fact that this population that was studied is very mobile, additional strategies are needed to increase retention rates.

Acknowledgements

This study was supported by CDC grant# DP000209-01 to the Center for the Promotion of Healthy Lifestyles and Obesity Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the CDC.

References

Ashwell, M., & Hsieh, S. D. (2005). Six reasons why the waist-to-height ratio is a rapid and effective global indicator for health risks of obesity and how its use could simplify the international public health message on obesity. *International Journal of Food Sciences and Nutrition, 56*(5), 303-307.

Allen, M.L., Elliott, M. N., Morales, L.S., Diamant, A. L., Hambarsoomian, K., & Schuster, M. A. (2007). Adolescent participation in preventive health behaviors, physical activity, and nutrition: Differences across immigrant generations for Asians and Latinos compared with Whites. *American Journal of Public Health, 97*(2), 337-343.

American Academy of Pediatrics (2001). Committee of public education: Children, adolescents, and television. *The Journal of Pediatrics, 107,* 423- 426.

Bailey, R., Wellard, I., & Dismore, H. (2005). *Girls' participation in physical activities and sports: Benefits, patterns, influences, and ways forward.* Retrieved on May 5, 2015 from: https://www.icsspe.org/sites/default/files/Girls.pdf

Black, M. H., Zhou, H., Takayanagi, M., Jacobsen, S. J., & Koebnick, C. (2013). Increased asthma risk and asthma-related health care complications associated with childhood obesity. *American Journal of Epidemiology*, *178*(7), 1120-1128.

Berelowitz, M. (2010). *The 16th annual report of the conditions of children in Orange County, California.* Retrieved on May 5, 2015 from http://www.ochealthinfo.com/occp/report/

Centers for Disease Control and Prevention (2009). *About BMI for children and teens: How is BMI calculated and interpreted for children and teens.* Retrieved on May 5, 2015 from http://www.cdc.gov/healthyweight/assessing/bmi/childrens_BMI/about_childrens_BMI.html

Centers for Disease Control and Prevention (2010). *Defining overweight and obesity.* Retrieved on May 5, 2015 from http://www.cdc.gov/obesity/defining.html.

Centers for Disease Control and Prevention (2015*). How much physical activity do children need?* Retrieved on May 5, 2015 from http://www.cdc.gov/physicalactivity/everyone/guidelines/children.html

Centers for Disease Control and Prevention (2011) Diabetes type 2. National diabetes fact sheet: national estimates and general information on diabetes and pre-diabetes in the United States. Retrieved on May 5, 2015 from http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf

Dreimane, D., Safani, D., MacKenzie, M., Halvorson, M., Braun, S., Conrad, B., . . . Kaufman, F. (2006). Feasibility of a hospital-based, family-centered intervention to reduce weight gain in overweight children and adolescents. *Diabetes Research and Clinical Practice, 75(2),* 159-168.

Epstein, L. H., Gordy, C. C., Raynor, H. A., Beddome, M., Kilanowski, C. K., & Paluch, R. (2012). Increasing fruit and vegetable intake and decreasing fat and sugar intake in families at risk for childhood obesity. *Obesity Research, 9*(3), 171–178.

Ford, E., Mokdad, A., & Ajani, U. (2004). Trends in risk factors for cardiovascular disease among children and adolescents in the United States. *The Journal of Pediatrics, 114*(6), 1534 -1544.

Freedman, D. S., Khan, L. K., Serdula, M. K., Dietz, W. H., Srinivasan, S. R., & Berenson, G. S., (2004). Inter-relations among childhood BMI, childhood height and adult obesity: The Bogalusa Heart Study. *International Journal of Obesity, 28*(1), 10-16.

Freedman, D. S., Mei, Z., Srinivasan, S. R., Berenson, G. S., & Dietz, W. H. (2007). Cardiovascular risk factors and excess adiposity among overweight children and adolescents: the Bogalusa heart study. *The Journal of Pediatrics, 150(1),* 12-17.

Gundersen, C., Garasky, S., & Lohman, B. (2009). Food insecurity is not associated with childhood obesity as assessed using multiple measurement of obesity. *Journal of Nutrition, 109,* 1173-1178.

Hassink, S. G., Hill, K. S., & Biddinger, S. (2011). Pediatric obesity: Practical applications and strategies from primary to tertiary care. *Pediatrics, 128,* S45–S90.

He, Q., & Karlberg, J. (2001). BMI in childhood and its association with height gain, timing of puberty, and final height. *Pediatric Research, 49*, 244–251.

Iannotti, R. J., Wang, J. (2013). Trends in physical activity, sedentary behavior, diet, and BMI among US adolescents, 2001-2009. *The Journal of Pediatrics*, *132*(4), 606-614.

Jordan, A.B., & Robinson, T.N. (2008). Children, television, and weight status: Summary and recommendations from an expert panel meeting. *Annals of the American Academy of Political and Social Sciences*, 615.

Katzmarzyk, P. T., Srinivasan, S. R., Chen, W., Malina R. M., Bouchard, C., & Berenson, G. S. (2004). Body mass index, waist circumference, and clustering of cardiovascular disease risk factors in a biracial sample of children and adolescents. *Pediatrics, 114,* 198-205.

Krebs, N. F., Himes, J. H., Jacobson, D., Nicklas, T. A., Guilday, P., & Styne, D. (2007). Assessment of child and adolescent overweight and obesity. *Pediatrics, 120,* S193.

Kumanyika, S. (2008). Environmental influences of childhood obesity: Ethnic and cultural influences in context. *Journal of Physiological Behavior, 94*, 61-70.

Nader, P. R., Bradley, R. H., Houts, R. M., McRitchie, S. L., & O'Brien, M. (2008). Moderate to vigorous physical activity from ages 9 to 15 years. *Journal of the American Medical Association, 300*(3), 295-305.

Ogden, C. L., Carroll, M. D., Kit, B.K., & Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *Journal of the American Medical Association, 311*(8), 806-814.

Ogden, C.L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. *Journal of the American Medical Association, 307*(5), 483-490.

Poirier, P. (2007). Adiposity and cardiovascular disease: Are we using the right definition of obesity? *European Heart Journal, 28*, 2047-2048.

Quattrin,T., Roemmich, J. N., Paluch, R., Yu, J., Epstein, L. H., & Ecker, M. A. (2012). Efficacy of family-based weight control program for preschool children in primary care. *Pediatrics, 130*(4), 660–666.

Savoye, M., Shaw, M., Dziura, J., Tamborlane, W. V., Rose, P., Guandalini, C., . . . Carprio, S. (2007). Effects of a weight management program on body composition and metabolic parameters in overweight children. *Journal of the American Medical Association, 297*(24), 2697-2704.

Strong, W. B., Malina, R. M., Blinkie, C. J., Daniels, S. R., Dishman, R. K., Gutin, B., . . . Trudeau, F. (2005). Evidence based physical activity for school age youth. *The Journal of Pediatrics, 146*(6), 732-737.

Tybor, D. J., Lichtenstein, A. H., Dallal, G. E., & Must, A. (2008). Waist-to-height ratio is correlated with height in US children and adolescents aged 2-18 years. *International Journal of Pediatric Obesity, 3*, 148-151.

U.S. Department of Health and Human Services (2012). *Health, United States, 2011: With special features on socioeconomic status and health.* U.S. Department of Health and Human Services, Hyattsville, MD; U.S. Retrieved on May 5, 2015 from http://www.cdc.gov/nchs/data/hus/hus11.pdf

U.S. Preventive Services Task Force. (2010).Screening for obesity in children and adolescents: U.S. Preventive Services Task Force recommendation statement. *Pediatrics, 125*(2), 361-367.

Weiss, J. W., Mouttapa, M., Nacpil, L. M., Rubin, D. & Gedissman, A. (2012). Evaluation of the effectiveness of an obesity intervention program for Latino youth. *Journal of Behavioral Health, 1*(2), 86-92.

Wilfley, D.E., Stein, R.I., Saelens, B.E., Mockus, D. S., Matt, G. E., Hayden-Wade, H. A., . . . Epstein, L. H. (2007). Efficacy of maintenance treatment approaches for children overweight: a randomized controlled trial. *Journal of the American Medical Association, 298*(14), 1661-1673.

Williamson, D. A., Walden, H. M., White, M. A., York-Crowe, E., Newton, R. L., Alfonso, A., et al. (2012). Two-year internet-based randomized controlled trial for weight loss in African American girls. *Obesity, 14*(7), 1231–124

Young, K. M., Northern, J. J., Lister, K. M., Drummond, J.A., & O'Brien, W. H. (2007). A meta-analysis of family behavioral weight-loss treatments for children. *Clinical Psychology Review, 27*, 240-249.

Author Information
Jie W. Weiss, Ph.D.
California State University, Fullerton
Department of Health Science
P.O. Box 6870
Fullerton, CA 92834
jweiss@fullerton.edu

*Melina H. Yepiz, M.P.H., C.H.E.S.
L.A. Care Health Plan
Health Education & Cultural Linguistics
1055 W. 7th St., 10th Floor
Los Angeles, CA 90017
myepiz@lacare.org

* corresponding author