Prosper, M.H., Moczulski V.L., Qureshi, A., Weiss,M., & Bryars,T. / Californian Journal of Health Promotion 2009, Volume 7, Special Issue (Obesity Prevention), Page numbers

Healthy for Life/PE4ME: Assessing an Intervention Targeting Childhood Obesity

Marie-Hortence Prosper[1], Vanessa L. Moczulski[1], Azhar Qureshi[1], Mike Weiss[2], Tracy Bryars[3]

[1]*Department of Community Health, St. Joseph Health System*

[2]*American Academy of Pediatrics, CA*

[3]*Saint Jude Medical Center, Fullerton, CA*

Abstract

Childhood obesity is a growing public health concern in the United States that disproportionately affects disadvantaged youth. The purpose of this study is to evaluate the effect of the Healthy for Life program on childhood overweight and obesity and its impact on lifestyle behaviors that promote lifelong fitness and healthy eating among children and adolescents. The program was offered as a physical education class mostly in schools in underprivileged areas across Southern California. Classes were specifically tailored for children in preschools, elementary, middle, and high schools. In addition to an initial screening physical conducted by a physician, program staff conducted anthropometric measurements three times in the school year. Lifestyle behaviors and self-esteem were also evaluated. Fifty-one schools and 1,469 students enrolled in the program. BMI decreased significantly for students at or above the 85th percentile. Students also demonstrated significant improvements in self-esteem scores and indicators for lifestyle behavior. Healthy for Life has important implications for health practitioners. The program has the potential to improve the health of underprivileged youth whose neighborhoods are unsafe and often lack facilities for exercise. Furthermore, it provides a safe, accessible, no cost, and effective method to minimize some of the causal factors of obesity.

Keywords: childhood obesity, physical activity, nutrition, self-esteem

Introduction

The proportion of children in the United States who are overweight or obese has reached alarming rates. According to the Centers for Disease Control and Prevention (CDC, n.d.), overweight is defined as a sex specific body mass index (BMI)-for-age between the 85th and 94th percentile and obese as the 95th percentile and above. Results from the National Health and Nutrition Examination Survey (NHANES) indicated that from NHANES II (1976-1980) to NHANES 2003-2004, the prevalence of overweight for children aged 2–5 years increased from 5.0% to 13.9%; for those aged 6–11 years, prevalence increased from 6.5% to 18.8%; and for those aged 12–19 years, prevalence increased from 5.0% to 17.4% (National Center for Health Statistics, 2006). It is currently estimated that 33.6% of children are considered overweight or obese with 17.1% of these classified as obese (Ogden et al., 2006). The childhood obesity rate in California mirrors that of the nation. The California Health Interview Survey (CHIS, 2007) indicated that 27.7% of adolescents aged 12-17 years are overweight or obese and 11.2% of children under the age of 12 are obese.

Obesity in childhood, particularly in adolescence is a key predictor for obesity in adulthood (Mamun, Hayatbakhsh, O'Callaghan, Williams, & Najman, 2009). Obese children have a 70% chance of becoming obese adults, which increases to 80% if one or more parents are obese (U.S. Department of Health & Human

Services, 2009). It is also more prevalent among racial/ethnic minority groups and low-income groups. For instance, an estimated 41.4% of Mexican American children aged 2-19 are overweight or obese, of which 20% are obese (Ogden et al., 2006). In addition, Mexican American children have greater increases in body weight over the course of development relative to other racial/ethnic groups (Burke et al., 1996; Kimm et al., 2001).

The adverse physical and psychological impacts of childhood obesity are well established. Overweight/obese children are at an increased risk of developing chronic diseases such as type II diabetes, premature cardiovascular disease, hypertension, sleep apnea, orthopedic problems, hyperlipidemia and fatty liver disease (Körner et al., 2008). Childhood obesity is also highly correlated with psychological distress. Obese children are stigmatized by their peers, and even by parents and teachers, as early as age three (Puhl & Latner, 2007). Furthermore, children who are teased, because of their weight are two to three times more likely to have suicidal ideation and attempts compared to those who are not teased (Eisenberg, Neumark-Sztainer, & Story, 2003). Obese adolescents who are rejected by their peers may also develop serious psychological distress, which manifests itself as low self-esteem, depressive symptoms, loneliness, anxiety, poor adjustment, and disruptive disorders (Prinstein, Boergers, & Vernberg, 2001; Storch & Masis-Warber, 2004).

The causal pathways of obesity are multifaceted and although sedentary lifestyles and excess caloric intake are the primary drivers of the epidemic, these are mediated by genetic, socioeconomic, and environmental variables (Barry, Brescoll, Brownell, & Schlesinger, 2009). Socioeconomic status, for instance, is an important predictor of childhood weight status. Adolescents aged 15-17 living in families below the federal poverty level have an obesity prevalence 50% higher than adolescents living above 200% of the poverty level (23.3% versus 14.4%, respectively) (Miech et al., 2006). Low socioeconomic status may influence weight status through a variety of environmental factors such as neighborhood safety, lack of access to parks and recreation, and the affordability and availability of healthy foods (McKay, Bell-Ellison, Wallace, & Ferron, 2007).

Schools are an ideal setting for obesity interventions because children spend a significant portion of their time in school. The school environment also has the potential to positively influence students' dietary and exercise patterns, establishing behavior change, which may persist into adulthood (Lytle, Seifert, Greenstien, & McGovern, 2000). Researchers have proposed integrating obesity reduction programs into existing physical education programs (Sharma, 2006). Schools located in disadvantaged neighborhoods, however, may not possess the necessary resources to implement such programs and are often overlooked (Sharma, 2006). Healthy for Life, a school-based childhood obesity reduction program, is an innovative intervention that is offered at no cost to schools.

Healthy for Life is designed to emphasize lifelong fitness and promote healthy eating behaviors among children and adolescents regardless of their weight status. The program was first launched as PE4ME by the American Academy of Pediatrics, CA Chapter 4 in 2004 in three schools. In 2008, PE4ME was implemented as Healthy for Life and was expanded to 51 schools through a partnership with St. Joseph Health System (SJHS). SJHS is a 15 hospital non-profit Catholic healthcare system that is driven by the long-term goal of ensuring that the communities it serves are among the healthiest in the US. The initial approach to achieve this goal is to address the childhood obesity epidemic through the implementation of Healthy for Life in schools across Orange County, CA.

The purpose of this paper is to provide the first evaluation of the short-term outcomes of Healthy for Life and explore its effect on the contributory causes of childhood obesity. It is hypothesized that there would be a significant

difference between pre and post BMI, Rosenberg self-esteem scores, and eating and activity behaviors for par icipants.

Methods

Program Description

Healthy for Life focuses on three main areas: the school environment through the School Health Index (SHI), physical activity, and nutrition. The SHI is an instrument created by the CDC to guide schools in evaluating and improving opportunities for physical activity and healthy nutrition for their students (CDC, 2007). The implementation of the SHI is in its initial stage; thus only the physical activity and nutrition components will be presented in this paper.

The physical and nutrition education components are specifically tailored for children in preschool and elementary school and for adolescents in middle and high schools. The physical education component teaches students the importance of being physically active. The Sports, Play and Active Recreation for Kids (SPARK) curriculum is used for the preschool and elementary students with lessons incorporated into their school day. Game cones, nylon rope, scooters, beach balls, foam and koosh balls, paddles, hoops, a 20-foot parachute and a crawl tunnel are supplied to the younger students as part of the SPARK curriculum. For the middle and high school students, the program is offered as a graded physical education (PE) class and the Fitness for Life textbook is used as a base for the curriculum. The fitness equipment for middle and high schools includes body bars, dumb bells, jump ropes, lower body bands, exercise tubing and exercise balls. As part of the physical activity curriculum, a certified kickboxing instructor leads a kickboxing workout session twice a month for the students. Each school is provided with the fitness equipment required for the program at no cost.

The nutrition education component of the program is incorporated into the PE class and aims to equip the students with knowledge that will enable them to make healthier eating and lifestyle choices. In addition to the class, a registered dietician provides two hour-long nutrition presentations to the students after school. For preschool and elementary students the presentations are specifically targeted for their parents who are encouraged to attend the lectures, offered in English and Spanish. The lessons and lectures are based on a variety of topics including the importance of eating breakfast daily, increasing vegetable and fruit consumption, methods on how to prepare cultural meals healthier, minimizing the consumption of foods that are high in fat and sugar, eating out healthy, how to read a nutrition label, and portion distortion. Middle and high school students are also encouraged to input their activity and food logs into the program website (http://www.healthyforlife.org) available in Spanish and English. A laptop computer is provided to each participating middle and high school to ensure access to a computer.

Participants and Methods of Selection

In the 2008-2009 school year, a convenience sample of 51 schools and 1,469 students enrolled in Healthy for Life. Twenty of these schools were Title 1 schools; which are schools where 40% of enrollment consists of children from low-income families (U.S. Department of Education, 2009). Middle and high school students were invited by school staff to join the program. For preschool and elementary students and those in middle and high school who chose to participate, parental notification and active consent were required and a parent information meeting was held before the start of the program.

Procedure

At the beginning of the school year PE teachers underwent training in order to facilitate the curriculum. Middle and high school teachers received four hours of training while preschool and elementary school teachers received six hours. The training was led by instructors who were certified in the respective curriculums (i.e. SPARK and Fitness for Life) and a master PE teacher who demonstrated and educated about the physical activity component of the program.

The program participants were assessed three times over the course of the school year. The assessments occurred before the start of the program, at midyear, and at year-end. Registered dieticians collected anthropometric data based on a standard protocol. Height was measured with a stadiometer without shoes and was reported in centimeters. Weight was determined with a calibrated digital scale and was measured in kilograms. Body mass index (BMI) calculations were based on the CDC's BMI-for-age growth charts for boys and girls. Weight classifications for BMI were defined as underweight <5th percentile; normal weight, 5th to <85th percentile; overweight, 85th to <95th percentile; and obese, ≥95th percentile (CDC, 2009). Overweight and obese students were combined for the purpose of analyses.

A board certified pediatrician conducted a screening physical on each student at the initial assessment and only students who were granted clearance from the pediatrician were eligible to participate in the program. The physician measured the participants' blood pressure and screened them for skin striae (stretch marks) and Acanthosis Nigricans, an early indicator of insulin resistance that is characterized by hyperpigmentation in areas such as skin folds of the abdomen and the back of the neck (Stuart et al., 1998). Blood pressure was measured on middle and high school students at the initial assessment and only those found to have elevated blood pressure for age, gender and height (≥95th percentile) were reassessed at midyear and year-end. Blood pressure was assessed using a standard blood pressure cuff and stethoscope. Child, adult and large size cuffs were available and the appropriate size was utilized as needed. Students found to have serious medical concerns were referred to their family doctor. If the student did not have a primary care physician a medical home was found for him/her. A medical home is a health care setting that provides comprehensive primary care (American Academy of Family Physicians, American Academy of Pediatrics, American College of Physicians, and American Osteopathic Association, 2007). Follow-up phone contact was initiated with the families to assure medical assessments took place.

In addition to the physiological measurements, three questionnaires were used to assess the students' lifestyle choices and their self-esteem. The eight-item lifestyle questionnaire used questions from previously validated research and explored screen time, dietary habits, physical activity, and sedentary behaviors (Edmunds & Ziebland, 2002; Francis, Lee, & Birch, 2003; Giammattei, Blix, Hopp Marshak, Wollitzer, & Pettitt, 2003; Kubik, Lytle, & Story, 2005). The tool was administered to middle and high school students and as a proxy measure for the preschool and elementary students, the questionnaire was adapted to the third person for the parents to complete.

Screen Time

Screen time, which includes television viewing, video games, and computer usage, has been shown to be a contributor to decreased physical activity and increased sedentary behavior during leisure time (Francis, Lee, & Birch, 2003). To assess screen time during leisure time the following question was asked, "how many hours per day do you participate in screen time (TV, video games, or computer)?" Three answer choices were provided, "less than two hours," two hours," and "more than two hours." For the purpose of analysis, the response choices were collapsed into two categories to assess the change in the least favorable behavior from baseline to year-end (i.e. greater than two hours versus two hours and less).

Nutrition

Seven questions regarding the weekly frequency of vegetable, fruit, breakfast, and milk consumption as well as the frequency of fast\restaurant food were asked. The questions included: "How many days per week do you...eat fast food/at restaurants; eat breakfast; eat junk food (cookies, candy, soda, chips, etc.); drink 2-3 8 oz cups of milk in a day; eat 5 or more fruits and/or vegetables in a day; and eat healthy snacks?" Three answer choices were provided: 0-2 days, 3-5 days, and 6 or more days. In the analysis, the responses to the questions on the consumption of milk, fruits and vegetables, and healthy snacks were dichotomized to assess the change from baseline to year-end in those who reported practicing the

behavior six or more days (i.e. 6 or more days versus 0-5 days). In the case of the questions assessing junk food and fast/restaurant food intake, the reverse was done (i.e. 0-2 days versus 3-5 and 6 or more days). Participants were also asked the type of milk they consume the most with the following question "please indicate ONE type of milk that you drink most often." The predetermined answer choices were "whole," "2% low fat," "1% low fat," "nonfat," "soymilk," and "none." Response choices were grouped into two categories in the analysis in order to assess the change in those adopting the more favorable behavior (i.e. 2% low fat, 1% low fat, nonfat, and soymilk, versus whole and none).

Physical Activity

One question was asked to assess physical activity, "how many days per week do you participate for 60 minutes or more in physical activity (walking, biking, running, sports)?" Three answer choices were provided: 0-2 days, 3-5 days, and six or more days. As with the previous variables, responses were collapsed into two categories to assess the students who responded six or more days, the more favorable behavior.

The second questionnaire used in the program, the Rosenberg Self-Esteem Scale, evaluated participants' self-esteem. The scale has been found to have high reliability; the statistically significant test-retest correlations are typically in the range of .82 to .88 and Cronbach's alpha are in the range of .77 to .88 (Blascovich & Tomaka, 1993; Rosenberg, 1986). The ten-item scale was administered to middle and high school students at the beginning and end of the school year. The answers to the questions are on a four-point Likert scale with the sums from all items equaling the score for that participant. Possible scores range from 0 to 30 with scores below 15 indicating low self-esteem.

The third questionnaire was used specifically for the preschool and elementary students. The tool was developed and validated by Calfas, Sallis, and Nader (1991) for use with children aged 4-8 years to measure their knowledge of healthy food and physical activity behaviors. The activity was conducted by staff at the initial and year-end assessments. The children were presented with 12 photo-pairs; one was a healthy food or activity and the other was not. The sum from all items is the score for that student. Possible scores ranged from 0 to 12.

Statistical Analysis

All statistical analyses were conducted using SPSS version 17.0 (SPSS Inc, Chicago, IL). Descriptive statistics included means and standard deviations where appropriate. Paired samples t test was used to evaluate the differences between initial and year-end BMI for all students, those at or above the 85th percentile, preschool and elementary students, and middle and high school students. Changes in the Rosenberg self-esteem scores and picture scale activity scores were also evaluated for all students and those categorized as overweight or obese using the paired t test. McNemar test was used to explore the change in proportions of the baseline and year-end lifestyle variables. A significance level of $p < .05$ was used for all analyses.

Results

During the 2008-2009 school year, 1,469 students enrolled in Healthy for Life. The characteristics of the participants are presented in Table 1. Most of the children were of Hispanic origin (66%) and female (55%). The mean age of the participants was 11.7 years (SD=4.6). The dropout rate during the school year was about 19% (n=280), leaving 1,189 students in the program. Of those who did not participate in the program, 5% (n=14) were discounted by the pediatrician due to health concerns and the remaining 95% (n=266) chose to withdraw. Demographic characteristics of the students who dropped out were studied. They were significantly older than the program participants with an average age of 16.2 years. Furthermore, there was no bias in terms of gender or race and ethnicity. Also, approximately 21% (n=246) of the remaining participants were found to have Acanthosis Nigricans.

Complete baseline and year-end anthropometric data were available for 932 (78%) students. At baseline 52% of the participants were categorized as under or normal weight, 17% overweight, and 31% obese. By the end of the year, 53% were under or normal weight, 18% overweight, and 29% obese. Average BMI for all students at baseline was 22.8 (SD=7.1) and 22.9 (SD=7.0) at year-end. Results from the paired t test indicate that the mean increase of .12 for all students over the course of the school year was significant [t(931)=-2.97; p= 0.003]. For students at or above the 85th percentile, average BMI was 27.7 (SD=7.0) at baseline and 27.6 (SD=7.1) at year-end. The mean decrease in BMI by 0.17 was found to be significant [t(447)= 2.33, p= 0.02] (see Table 2).

Table 1. Characteristics of the Healthy for Life Participants

Age in years (mean ± SD)	11.7 ± 4.6
Sex % (n)	
Male	45.1 (535)
Female	54.9 (652)
Race/Ethnicity % (n)	
Hispanic	65.7 (714)
Non-Hispanic White	13.1 (142)
Asian/Pacific Islander	9.9 (108)
African American	1.3 (14)
Multi-Ethnic	3.2 (35)
Native American	1.0 (11)
Other	5.7 (62)
Education Level % (n)	
Preschool and Elementary	30.7 (365)
Middle and High School	69.3 (824)
Observed Acanthosis Nigricans % (n)	20.7 (246)

Note. The total number of students may be less than 1,189 due to missing data.

Table 2. Mean difference in BMI and Self-Esteem Scores Pre and Post Intervention

	Baseline	Year-End	p-value
Mean BMI (SD)			
All students	22.8 (7.1)	22.9 (7.0)	0.003
Overweight and Obese	27.7 (7.0)	27.6 (7.1)	0.02
Preschool and Elementary School	16.8 (2.0)	16.9 (2.0)	0.025
Overweight and Obese	18.9 (1.8)	18.8 (2.0)	0.583
Middle and High School	25.5 (6.9)	25.6 (6.7)	0.022
Overweight and Obese	30.4 (5.7)	30.2 (5.9)	0.024
Mean Self-Esteem Score (SD)			
Overweight and Obese	20.5 (5.2)	21.2 (4.9)	0.004
Middle and High School	21.3 (5.2)	21.7 (5.1)	0.014

Note. N=1,189

Preschool and elementary school students had an average BMI of 16.8 (SD=2.0) at baseline and 16.9 (SD=2.0) at year-end. The average year-end BMI for preschool and elementary students was significantly higher by 0.11 [t(286)=-2.25; p=.025]. For preschool and elementary students

who were overweight or obese, mean BMI was 18.9 (SD=1.8) at baseline and 18.8 (SD=2.0) at year-end. This decrease was not significant [t(102)=0.55; p=.583]. Middle and high school students exhibited similar patterns. Mean BMI for middle and high school students was 25.5 (SD=6.9) at the beginning of the school year and 25.6 (SD=6.7) at the end. The average BMI was significantly higher at year-end [t(644)=2.27; p=.024]. The mean BMI for middle and high school students who were overweight or obese at baseline (30.4, SD=50.7) decreased significantly by .21 [t(344)=2.27; p=.024] over the course of the school year.

At baseline, the average self-esteem score for middle and high school students was 21.3 (SD= 5.2) and 21.7 (SD= 5.1) at year-end. Results from a paired t test indicate that mean self-esteem scores were significantly higher at year-end compared to baseline [t(739)=-2.46, p=0.014]. Similarly, students at or above the 85th percentile had improved self-esteem by the end of the school year. The mean score at baseline was 20.5 (SD=5.2) and 21.2 (SD=4.9) at year-end. Findings suggest a statistically significant difference between baseline and year-end average scores [t(320)=-2.77, p=0.006].

The average score for the overall healthy choices for children in preschool and elementary grades improved significantly over the course of the school year [t(287)=-2.98, p= 0.003]. In addition, results indicate significant differences in five of the eight lifestyle behaviors tested (see Table 3). Fewer students reported daily screen time of greater than two hours at year-end (p=0.001). More students at year-end reported exercising six or more days a week at year-end compared to baseline (p=0.001). At the final assessment, more participants indicated that they eat junk food 0-2 times weekly compared to the initial assessment (p=0.007). More students reported drinking soymilk, nonfat, 1% and 2% low fat milk at year-end compared to baseline (p= 0.001). In terms of breakfast intake, the proportion of students who reported eating breakfast six or more times a week was significantly lower at year-end (p<0.001).

Table 3. Lifestyle Factors Pre and Post Intervention

	Baseline %	Year-end %	p-value
Screen time > 2 hours	14.0	15.0	.619
Breakfast ≥ 6 times a week	51.3	0.8	<.001
Junk food 0-2 times a week	15.6	20.0	.027
1%, 2%, nonfat and soy milk consumption	5.4	9.7	.001
2-3 8oz cups of milk ≥ 6 times a week	12.6	15.6	.099
5 or more Fruits and/or Vegetables ≥ 6 times a week	11.3	12.5	.468
Fast Food 0-2 times a week	6.8	8.6	.190
Exercising ≥ 6 times a week	12.0	17.8	.001

Note. N=1,189

Discussion

Healthy for Life is a program that aims to reduce the rates of overweight and obesity among children and adolescents. It accomplishes this by empowering students with knowledge and tools that aid them in making healthier lifestyle choices. The purpose of this study was to evaluate how effective the program was at achieving its goal. We hypothesized that there would be a significant difference between pre and post BMI, Rosenberg self-esteem scores, and eating and activity behaviors for participants. Results confirmed these hypotheses. Mean BMI for all students regardless of educational level increased significantly; which is to be expected since the participants were still developing physiologically. Students who were categorized as overweight or obese, however, did significantly reduce their BMI.

Self-esteem is vital in children's development and previous research has suggested that obesity

may interfere with children experiencing feelings of self-worth (Robinson, 2006; Puhl & Latner, 2007). One of the key measures in Healthy for Life is the Rosenberg self-esteem scale. Findings indicate that on average, students significantly improved their self-esteem over the course of the school year. In terms of lifestyle behaviors, preschool and elementary students made healthier food and activity choices at the end of the school year compared to the initial assessment as measured by the picture scale activity. Participants also showed improvement in other behaviors including exercise six or more times weekly, minimizing junk food intake to two times or less weekly, and including milk in their diet or decreasing the consumption of whole milk. The proportion of students who reported eating breakfast six or more times a week significantly decreased during the school year. Although not statistically significant, findings suggest that students adopted healthier lifestyles in terms of the weekly consumption of fruits and vegetables, fast/restaurant food, and milk.

School-based obesity interventions focusing on healthy eating and physical activity provide an opportunity to improve the health of children since most children in the United States are enrolled in school. However, a limited number of studies have been conducted, results have been variable, and few school-based interventions have demonstrated significant reductions in participant BMI. Since the causal pathways of obesity are so multifaceted, additional support from home, community, policy change, and healthcare environments are necessary to support children's learned behavior from school-based obesity interventions.

Limitations

Although this study reports significant findings, it is not without weaknesses. Causal inferences could not be made due to the study design. Furthermore, the results from the lifestyle questionnaire used in the program were obtained through self-report, thus validity and reliability could not be assessed, which may have led to some biases.

Acknowledgements

Healthy for Life was supported by funding from St. Joseph Health System and St. Joseph Health System Foundation. The authors would like to thank Jhovanna Midencey, Kimberly Reynolds, Lisa Navarro, and Dennis Gauci for their contribution in the completion of this manuscript.

References

American Academy of Family Physicians, American Academy of Pediatrics, American College of Physicians, and American Osteopathic Association. (2007). Joint principles of the patient-centered medical home. Available at: http://pcpcc.net/content/joint-principles-patient-centered-medical-home. Accessed November 2, 2009.

Barry, C. L., Brescoll, V. L., Brownell, K. D., & Schlesinger, M. (2009). Obesity metaphors: how beliefs about the causes of obesity affect support for public policy. *The Milbank Quarterly, 87*(1), 7-47.

Blascovich, J. & Tomaka, J. (1993). Measures of self-esteem. In J.P. Robinson, P.R. Shaver, & L.S. Wrightsman (Eds.), *Measures of personality and social psychological attitudes* (pp. 115-160). Ann Arbor: Institute for Social Research.

Burke, G. L., Bild, D. E., Hilner, J. E., Folsom, A. R., Wagenknecht, L. E., Sidney, S. (1996). Differences in weight gain in relation to race, gender, age and education in young adults: the CARDIA Study. Coronary artery risk development in young adults. *Ethnicity & Health, 1*, 327-335.

Calfas, K.J., Sallis, J.F., and Nader, P.R. (1991). The development of scales to measure knowledge and preference for diet and physical activity behavior in 4- to 8-year-old children. *Journal of Developmental and Behavioral Pediatrics, 12*, 185-190.

California Health Interview Survey. (2007). CHIS 2007 Adolescent and child public use file. Release 1 [computer file]; Los Angeles, CA: UCLA Center for Health Policy Research. Available at: http://www.chis.ucla.edu/main/default.asp. Accessed November 15, 2009.

Centers for Disease Control and Prevention (n.d.). Defining childhood overweight and obesity. Available at: htt ://www.cdc.gov/obesity/childhood/defining.html. Accessed August 3, 2009.

Centers for Disease Control and Prevention. (2007). State-level school health policies and practices: A state-by-state summary from the school health policies and programs study 2006. Atlanta: U.S. Departments of Health and Human Services.

Centers for Disease Control and Prevention. (2009). Clinical growth charts. Available at: http://www.cdc.gov/growthcharts/clinical_charts.htm. Accessed August 3, 2009.

Edmunds, L. D. & Ziebland, S. (2002). Development and validation of the Day in the Life Questionnaire (DILQ) as a measure of fruit and vegetable questionnaire for 7-9 year olds. *Health Education Research, 17*, 211-220.

Eisenberg, M. E., Neumark-Sztainer, D., & Story, M. (2003). Associations of weight-based teasing and emotional well-being among adolescents. *Archives of Pediatrics and Adolescent Medicine, 157*, 733–38.

Francis, L. A., Lee, Y., & Birch, L. L. (2003). Parental weight status and girls' television viewing, snacking, and body mass indexes. *Obesity Research, 11*, 143-151.

Giammattei, J., Blix, G., Hopp Marshak, H., Wollitzer, A. O., & Pettitt, D. J. (2003). Television watching and soft drink consumption. Associations with obesity in 11- to 13-year-old schoolchildren. *Archives of Pediatrics & Adolescent Medicine 157*, 882-886.

Kimm, S., Barton, B., Obarzanek, E., McMahon, R., Sabry, Z., Waclawiw, M.,...Daniels, S. (2001). Racial divergence in adiposity during adolescence: the NHLBI Growth and Health Study. *Pediatrics, 107*, E34-E40.

Körner, A., Kratzsch, J., Gausche, R., Blher, S., Kapellen, T., Pulzer, F., Behrens, M., & Kiess, W. (2008). Metabolic syndrome in children and adolescents- risk for sleep disordered breathing and obstructive sleep-apnoea syndrome? *Archives of Physiology Biochemistry, 114*, 237-243.

Kubik, M. Y., Lytle, L. A., & Story, M. (2005). Soft drinks, candy, and fast food: What parents and teachers think about the middle school food environment. *Journal American Dietetic Association, 105*, 233-239.

Lytle, L. A., Seifert, S., Greenstien, J., & McGovern, P. (2000). How do children's eating patterns and food choices change over time? Results from a cohort study. *American Journal of Health Promotion, 14*, 222-228.

Mamun, A. A., Hayatbakhsh, M. R., O'Callaghan, M., Williams, G., & Najman, J. (2009). Early overweight and pubertal maturation-pathways of association with young adults' overweight: a longitudinal study. *International Journal of Obesity, 33*, 14-20.

McKay, C. M., Bell-Ellison, B. A., Wallace, K., Ferron, J. M. (2007). A multilevel study of the associations between economic and social context, stage of adolescence, and physical activity and body mass index. *Pediatrics, 119*, 84-91.

Miech, R. A., Kumanyika, S. K., Stettler, N., Link, B. G., Phelan, J.C., Chang, & V. W. (2006). Trends in the association of poverty with overweight among US adolescents, 1971-2004. *Journal of the American Medical Association, 295*, 2385-2393.

National Center for Health Statistics. (2006). Prevalence of overweight among children and adolescents: United States, 2003-2004. Available at: http://www.cdc.gov/nchs/data/hestat/overweight/overwght_child_03.htm. Accessed August 3, 2009.

Ogden, C. L., Carroll, M. D., Curtin, L. R., McDowell, M. A., Tabak, C. J., & Flegal, K. M. (2006). Prevalence of overweight and obesity in the United States, 1999-2004. *Journal of the American Medical Association, 295*, 1549-1555.

Prinstein, M. J., Boergers, J., & Vernberg, E. M. (2001). Overt and relational aggression in adolescents: Social-psychological adjustment of aggressors and victims. *Journal of Clinical Child Psychology, 30*, 479-491.

Puhl, R. M., & Latner, J. D. (2007). Stigma, obesity, and the health of the nation's children. *Psychological Bulletin, 133*, 557-580.

Robinson, S. (2006). Victimization of obese adolescents. *Journal of School Nursing, 22*, 201-206.

Rosenberg, M. (1986). Conceiving the self. Malabar, FL: Krieger.

Sharma, M. (2006). School-based interventions for childhood and adolescent obesity. *Obesity Reviews, 7*, 261-269.

Storch, E. A. & Masis-Warber, C. (2004). The relationship of peer victimization to social anxiety and loneliness in adolescent females. *Journal of Adolescence, 27*, 351-362.

Stuart, C. A., Gilkison C. R., Smith, M. M., Bosma, A. M., Keenan, B. S., & Nagamani, M. (1998). Acanthosis Nigricans as a risk factor for non-insulin diabetes mellitus. *Clinical Pediatrics, 37*, 72-79.

U.S. Department of Education. (2009). Improving basic programs operated by local educational agencies (Title I, part A). Available at: http://www.ed.gov/programs/titleiparta/index.html. Accessed November 2, 2009.

U.S. Department of Health & Human Services (2007). The Surgeons General's call to action to prevent and decrease overweight and obesity. Available at: http://www.surgeongeneral.gov/topics/obesity/calltoaction/fact_adolescents.htm. Accessed July, 7, 2009.

Author Information

Marie-Hortence Prosper, MPH, MBA*
Department of Community Health
St. Joseph Health System
500 S. Main Street, Suite 900
Orange, CA 92868-4533
Telephone: (714).347.7729 Tel
Telephone: (714).347.7524 Fax
E-mail: marie-hortence.prosper@stjoe.org

Vanessa L. Moczulski, MPH, MSHCA (c)
Department of Community Health
St. Joseph Health System

Azhar Qureshi, MD, MBA, DrPH
Department of Community Health
St. Joseph Health System

Mike Weiss, DO
American Academy of Pediatrics, CA Chapter 4

Tracy Bryars, RD, CDE, CLE
St. Jude Medical Center, Fullerton, CA
* corresponding author