



**Iowa Pilot Intervention Summary Report
School-Age Children's Nutrition &
Physical Activity Project:
School Years 2007-2009**



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Introduction

Although childhood overweight and obesity have been long-standing public health problems, recent increases have raised the level to epidemic proportions. A 2005 Institute of Medicine (IOM) report estimated that approximately nine million children over six years of age were overweight. These findings, based upon measured weight and height, reflect a substantial and alarming increase in childhood obesity. Among children and adolescents aged 2 through 19 years, 11.9 percent were at or above the 97th percentile of the BMI-for-age growth charts; 16.9 percent were at or above the 95th percentile; and 31.7 percent were at or above the 85th percentile. Prevalence estimates differed by age and by race/ethnic group. Between 2005 and 2006, 15 percent of children ages 6 to 11 years were overweight and 18 percent of adolescents ages 12 to 17 years were overweight (Federal Interagency Forum on Child and Family Statistics, 2009). Trend analyses indicate no significant trend between 1999 and 2000, as well as 2007 and 2008 except at the highest BMI cut point (i.e., \geq 97th percentile) among boys ages 6 through 19 years (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010).

The epidemic of overweight and obesity is concerning because of the potential impact on a child's current and future health. Overweight children are more likely to be obese as adults. Childhood obesity does continue into adulthood (Dietz, 1998), increasing the prevalence of morbidity and mortality in adults.

As is the case with adults, being overweight or obese is known to be correlated with increased risk of health problems for children. However, unlike adults, children's bodies are developing and height is attained with age. Boys and girls tend to have different growth patterns at different ages. For this reason, when determining whether or not a child's weight is healthy, BMI is compared with the BMI of other children of the same age and gender (Riddoch, Mattocks, Deere, Saunders, Kirkby, Tilling, Leary, Blair, & Ness, 2007). For comparison, gender-specific standardized growth charts are used to

plot the child's BMI against his or her age. From the chart, one can read the child's BMI percentile, or how the child's BMI number compares to that of healthy children of the same age and gender. A child with a BMI within the 5th and 84th percentile is considered to be at a healthy weight; between 85th and 94th is considered overweight, and greater than 95th is obese. BMI is a reliable indicator of health risk at the aggregated population level. If an individual child is found to be overweight or obese based on BMI percentile, it is recommended that their health care provider perform further assessments of body composition before diagnosis (Riddoch, et al., 2007).

Poor nutritional patterns and sedentary behaviors are linked to overweight and obesity, as well as the development of a number of seriously disabling and life threatening conditions. For example, a potential complication of childhood overweight is Type 2 Diabetes Mellitus (DM), a condition also increasing by epidemic proportions. Besides Type 2 DM, overweight youth are at-risk of becoming overweight adults with associated problems of coronary artery disease, hypertension, stroke, respiratory problems, gallbladder disease, osteoarthritis, sleep apnea, some forms of cancer, and premature death.

Physical activity and nutritional behaviors during childhood and adolescence provide many short and long-term health benefits. In addition to reducing risks for high blood pressure (Leary, Ness, Smith et al., 2008), physical activity and optimal nutrition in children are associated with a decreased risk of obesity (Ness, Leary, et al., 2007).

Promoting regular physical activity and healthy nutrition, as well as creating an environment that supports these behaviors, is essential to addressing the epidemic of overweight and obesity. In Iowa, local and state entities have become increasingly concerned with the problem of childhood overweight and how to address the problem. The Iowa Department of Public Health (IDPH) has developed and implemented a comprehensive nutrition and physical activity plan for the prevention of obesity. The Iowans' Fit for Life Intervention, one component of Iowa's Comprehensive Nutrition and Physical Activity Plan, is a pilot project based on scientific evidence and theory. The purpose of the intervention is to implement and evaluate a nutrition and physical activity program.

Communities and schools across the State of Iowa participated in the nutrition and physical activity intervention program. Evaluation included consistent measures of the program across time and following relevant outcomes over several years.

The overall goals of the nutrition and physical activity project are to:

- Move children towards the healthy lifestyle behaviors of eating more fruits and vegetables daily, and
- Move children towards being physically active 60 minutes per day.



Twelve schools were randomly assigned to one of four programmatic groups.

1. Three schools had no formal program during the final two years (i.e., 2007-2009).
2. Three schools participated in the Free Fresh Fruit and Vegetable Program funded through United States Department of Agriculture (USDA) in cooperation with the Iowa Department of Education (DOE).
3. Three schools participated in an Iowa Department of Public Health (IDPH) school and community program.
4. Three schools participated in the Free Fresh Fruit and Vegetable Program, plus an IDPH school and community program.

Program Evaluation

Program evaluation surveys were completed biannually by students, parents, teachers, food service staff, school nurses, principals, and community members. Teachers and school staff completed surveys of actual implementation, feedback on program elements, and a school assessment of the nutrition and physical activity environment. The results in the current report are based on surveys completed by students during the 2007 to 2009 academic years.

Results

Sample

The majority of children participating in the project were white, non-Hispanic (95.8%). Hispanic and African Americans students made up approximately 1% of the sample, 1.3% were Asian, and 1% were Native American or of other ancestry. A large percentage of the children came from a two parent household. Of those completing surveys, 71.8% of children came from a two parent household, 16.3% reported one parent and one step-parent, and 11.9% of children did not currently live in a two parent household.

Body Mass Index

Height and weight measurements were taken to calculate each student's Body Mass Index (BMI). The percent overweight and the percent obese were determined by comparing the students' BMI to age-based and gender-specific national norms. Obesity is defined as a BMI at or above the 95th percentile by age; overweight is defined as a BMI between the 85th and 95th percentile by age.

Among the 3rd, 4th, and 5th grade youth participating in the project who were measured during the Spring 2009 assessment (954 students), 61.2 percent had a normal BMI; 23

percent were considered overweight; and 15.8 percent were considered obese. 62.6 percent of 3rd graders, 68.8 percent of 4th graders, and 64.1 percent of 5th graders were at a normal BMI (Figure 1). In addition, among all boys, 67.9 percent were in the normal BMI-for-age range, 15.6 percent were overweight, and 16.5 percent were obese (see Figure 2). Among all girls, 68.8 percent were in the normal BMI-for-age range, 14.3 percent were overweight, and 16.8 percent were obese.

Figure 1. BMI Prevalence Rates by Grade, Spring 2009 (N=954).

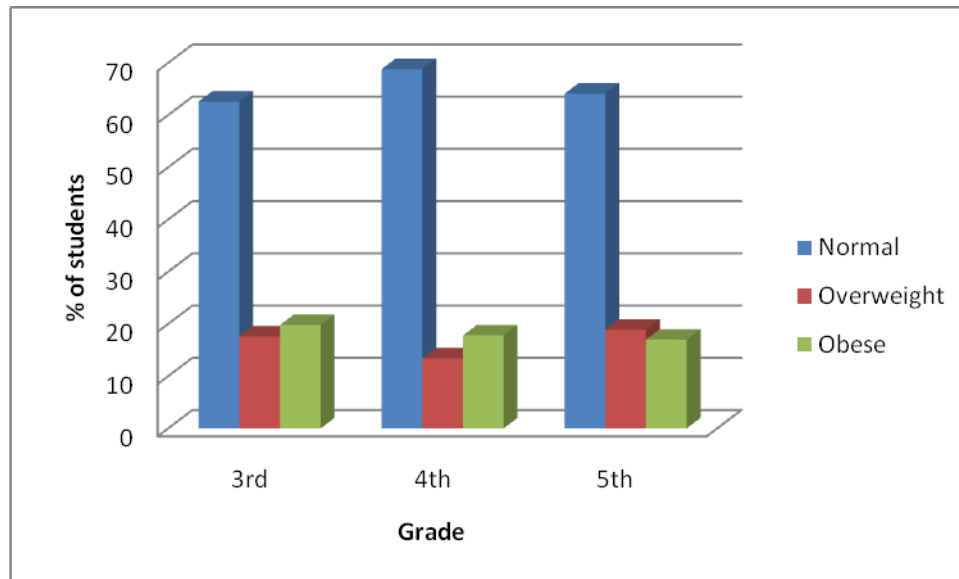


Figure 2. BMI Prevalence Rates by Gender, Spring 2009 (N=954).

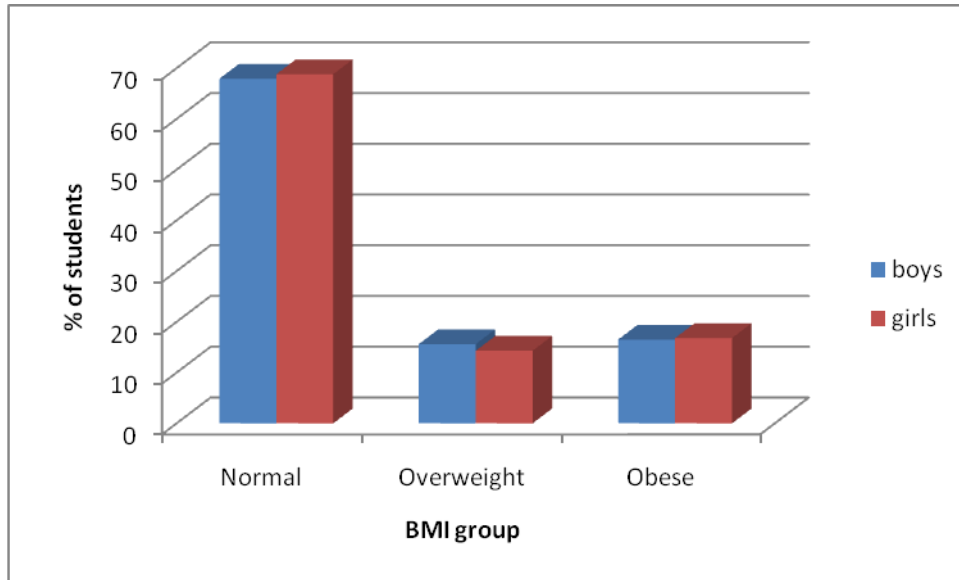
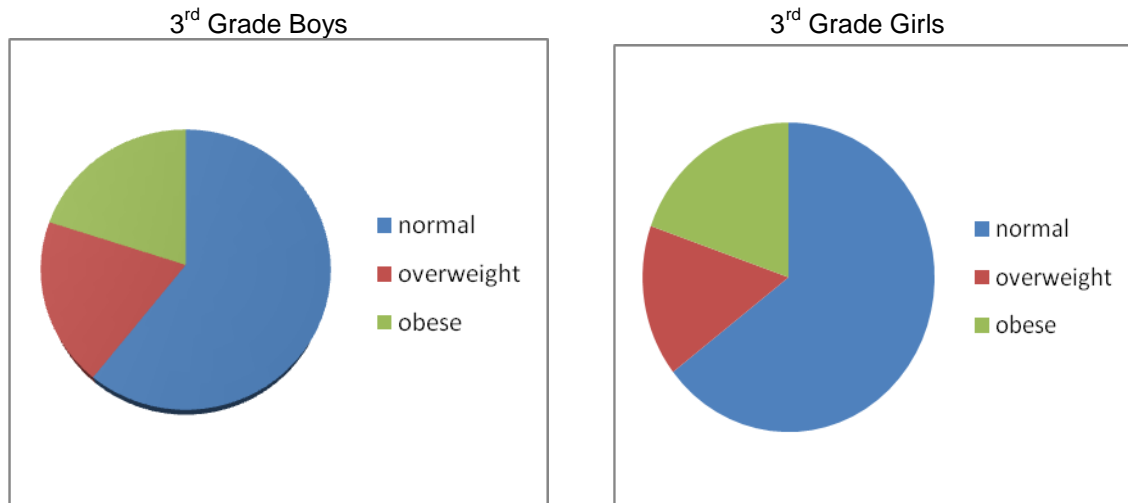


Figure 3 indicates 39.3 percent of 3rd grade boys and 35.5 percent of 3rd grade girls were overweight or obese at the Spring 2009 assessment.

Figure 3. BMI Prevalence Rates among 3rd Grade Students by Gender, Spring 2009.



At the Spring 2009 assessment, 28.7 percent of 4th grade boys and 33.7 percent of 4th grade girls were overweight or obese (Figure 4).

Figure 4. BMI Prevalence Rates among 4th Grade Students by Gender, Spring 2009.

4th Grade Boys

4th Grade Girls

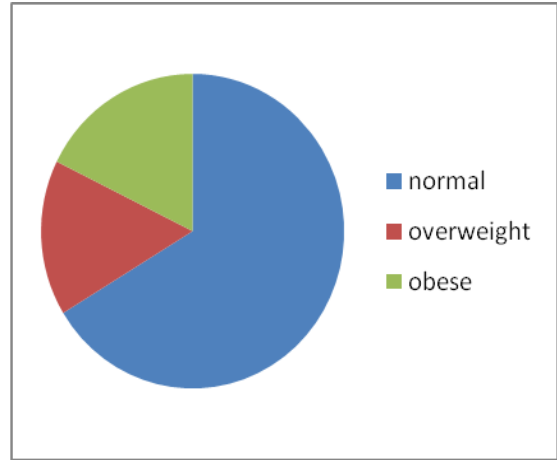
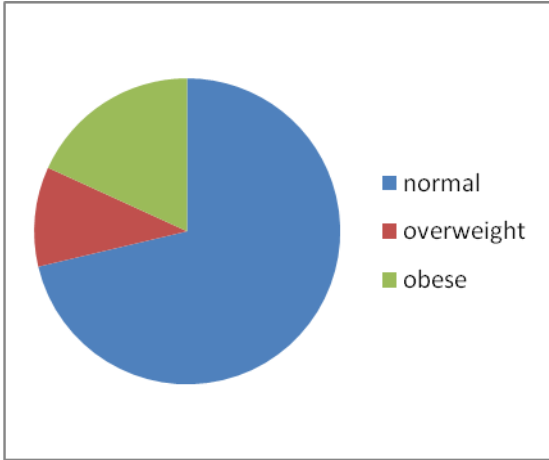
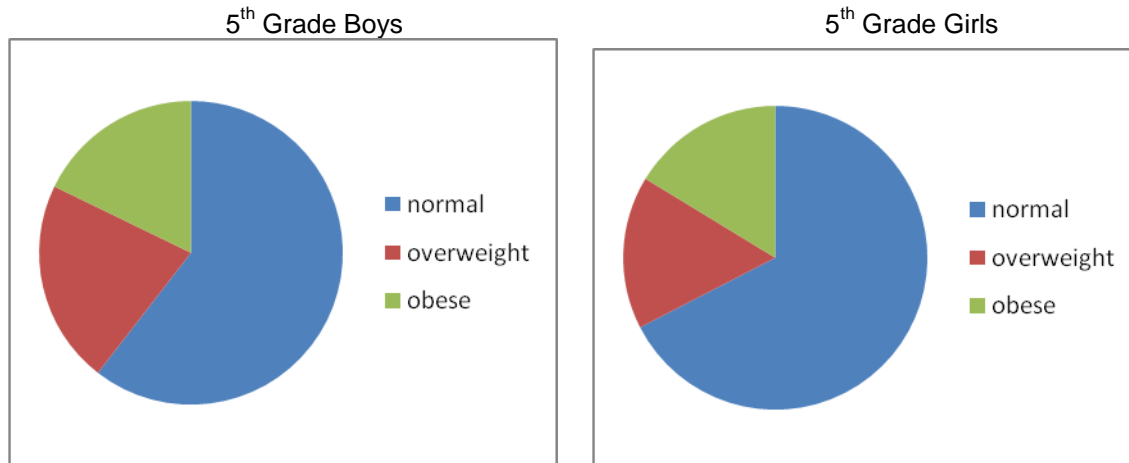


Figure 5 indicates 39.5 percent of 5th grade boys and 32.6 percent of 5th grade girls were overweight or obese.

Figure 5. BMI Prevalence Rates among 5th Grade Students by Gender, Spring 2009.



Youth Physical Activity

A number of studies have shown that many youth do not meet physical activity guidelines (Riddoch et al., 2007). Moreover, physical activity declines and sedentary behavior becomes more common between the ages of 10 and 12 years (Brodersen, Steptoe, Boniface, & Wardle, 2007). These findings highlight the need to identify the factors that contribute to participation in regular physical activity during childhood.

The project measured physical activity with items on the student self-reported Physical Activity Questions for Children (PAQ-C) and the Children's Physical Activity Correlates (CPAC) (Welk, Schaben, & Shelley, 2004), plus pedometer step counts. The PAQ-C (Crocker et al., 1997; Kowalski et al., 1997a; Kowalski et al., 1997b) is designed to provide an overall indicator of children's physical activity. The scale consists of nine items that capture a child's "typical" level of activity in different settings and different times; it is designed to evaluate activity in the last seven days but also assesses the "typical" level of physical activity. The scale uses a series of 10 questions that measure activity habits at different times of the day (i.e., both in and out of school, as well as on evenings and weekends). Each question is scored on a 1 ("None") to 5 ("5 times last week") scale.

Concepts in the CPAC were assessed using a structured alternative format to reduce tendencies for socially desirable responses (i.e., "Really true for me"; "Sort of true for me"). The CPAC scales include:

- Attraction to Physical Activity

Five items from the Children's Attraction to Physical Activity scale measured expectations for physical activity (i.e., the value or benefit associated with regular participation).

- Perceived Competence

Measured efficacy expectations (i.e., confidence in being able to be physically active).

- Parental Influence

This scale was assessed with four subscales (three items per subscale) that measured different dimensions of parental influence (i.e., role modeling, encouragement, involvement, facilitation). A composite indicator of parental influence was computed by taking the mean from the four different subscales.

Findings from the Spring 2009 CPAC scales included significant differences. Students in the four program intervention groups had similar scores on the Attraction to Physical Activity scale and the Perceived Competence scale. There were significant differences on the Parental Influence scale (Table 1).

Table 1. Children's Physical Activity Correlates Scales by Group

	No Program	IDPH	USDA	Both IDPH & USDA
Scales	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)
Attraction to Physical Activity	3.3 (.4)	3.3 (.5)	3.1 (.6)	3.2 (.6)
Perceived Competence	3.2 (.6)	3.1 (.7)	3.1 (.6)	3.2 (.6)
Parental Influence*	3.2 (.4)	3.0 (.6)	3.1 (.5)	3.0 (.5)

Figure 6 illustrates scores on the CPAC scales by gender at the Spring 2009 assessment. For the most part, girls had lower scores except for the Parental Influence scale. Differences were significant between boys and girls on the Parental Influence and the Attraction to Physical Activity scales; boys had higher scores on both scales.

Figure 6. Children's Physical Activity Correlates Scales by Gender, Spring 2009.

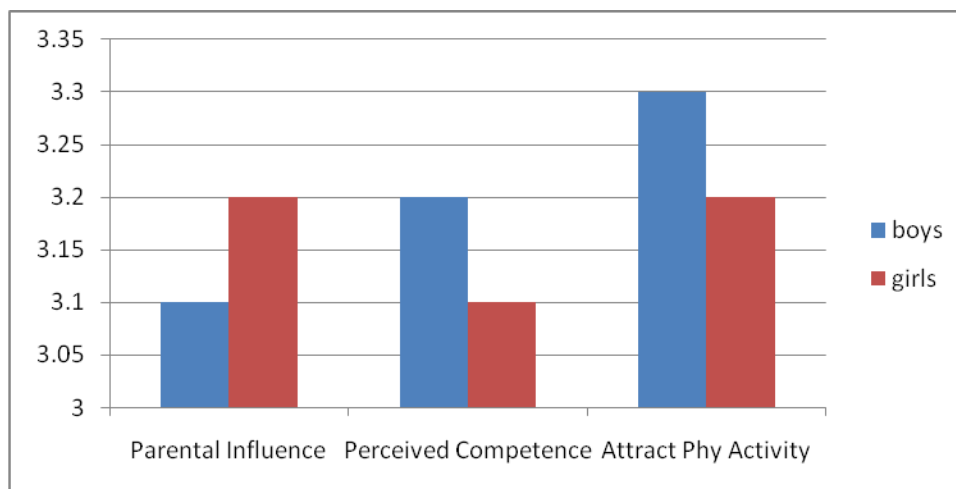
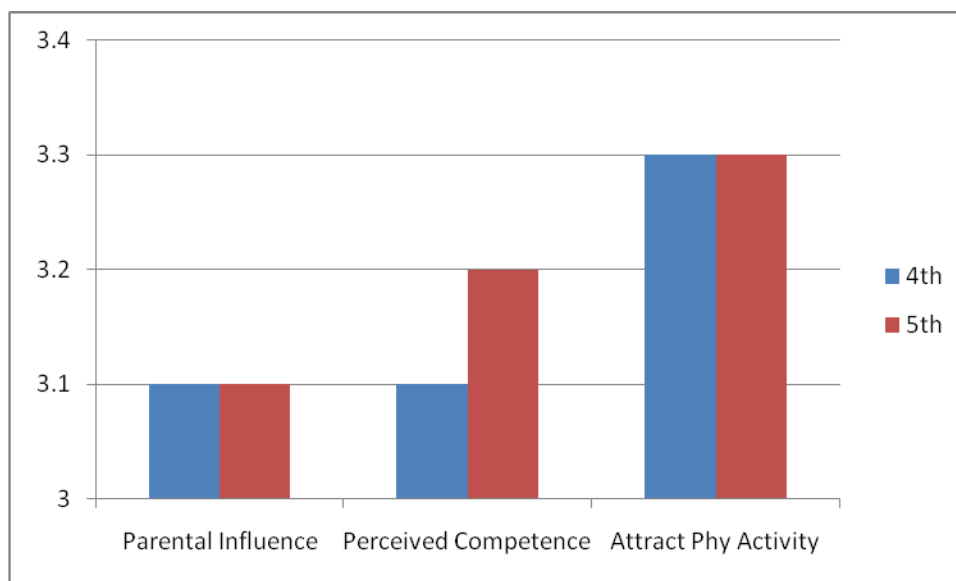


Figure 7 illustrates the CPAC scales by grade. Generally, 4th and 5th grade students had similar scores on the Attraction to Physical Activity scale and the Parental Influence scale. 5th grade students had higher scores on the Perceived Competence scale than 4th grade students.

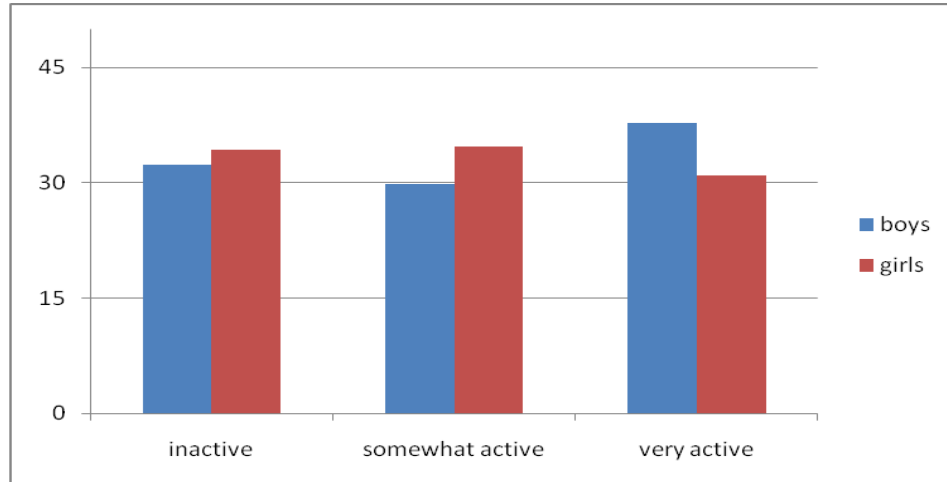
Figure 7. Children's Physical Activity Correlates Scales by Grade, Spring 2009.



Overall PAQ-C scores (i.e., “inactive”, “somewhat active”, “very active”) by gender for 4th and 5th grade students are displayed in Figure 8. Scores ranged from 1 (“Inactive”) to 5 (“Very active”) and were divided into thirds. A higher percentage of boys compared with

girls self-described as “very active”; a higher percentage of girls compared with boys self-described as “somewhat active”.

Figure 8. Physical Activity Levels by Gender, Spring 2009.



Overall PAQ-C scores by grade are displayed in Figure 9. Among 5th grade students, a higher percentage self-described as “somewhat active” while a higher percentage of 4th grade students self-described as “very active”.

Figure 9. Physical Activity Levels by Grade, Spring 2009.

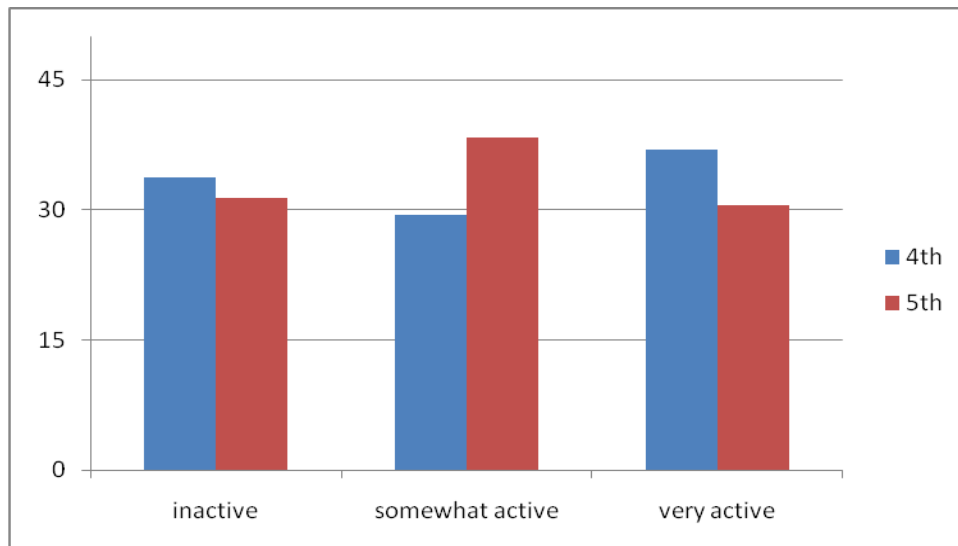


Table 2 illustrates scores from Fall 2008 to Spring 2009 for several of the questions on the PAQ-C (i.e., 1 = “no activity” to 5 = “very active”).

Table 2. Physical Activity Questionnaire for Children by Program Group, Fall 2008 – Spring 2009.

	No Program		IDPH		USDA		Both USDA & IDPH	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
In the last 7 days:								
During your physical education classes, how often were you very active?	4.4	4.6	4.4	4.3	4.0	4.3	4.5	4.6
On how many days right after school, did you do sports, dance or play games in which you were very active?	3.5	3.7	3.7	3.8	3.6	3.5	3.5	3.8
On how many evenings, did you do sports, dance or play games in which you were very active?	3.6	3.8	3.5	3.5	3.5	3.6	3.5	3.6
During the last weekend, how many times did you do sports, dance or play games in which you were active?	3.7	3.9	3.6	3.7	3.7	3.7	3.5	3.7
How often you did physical activity (sports, dance, games) each day last week.	3.7	3.9	3.7	3.7	3.6	3.7	3.6	3.7

Table 3 illustrates scores from the Spring 2009 assessment in which students were asked about their overall level of physical activity in the last seven days. The question is scored on a scale of 1 (“All or most of my free time was spent doing things that involve little physical effort”) to 5 (“I very often (seven or more times last week) did physical things in my free time”).

Table 3. Physical Activity Questionnaire for Children by Group, Spring 2009.

No Program	IDPH	USDA	Both USDA & IDPH
3.8	3.7	3.7	3.8

Gender differences for several of the questions on the PAQ-C are displayed in Table 4. For the most part, a greater percentage of girls, compared to boys, reported more intense levels of physical activity on the six items. The greatest difference between boys and girls was found for the question related to activity levels during the past week. 70.2 percent of girls reported “I quite often did physical things in my free time” to “I very often did physical things in my free time” compared to only 59.9 percent of boys reporting on the same level of physical activity.

Table 4. Physical Activity by Gender, Spring 2009.

In the last 7 days:	Boys %	Girls %
During your physical education classes, how often were you very active? (“quite often” to “always”)	89.1	92.2
What did you normally do at lunch time? (“ran around and played quite a bit” to “ran and played hard most of the time”)	86.5	78.2
On how many days right after school did you do sports, dance or play games in which you were very active? (“4 times last week” to “5 times last week”)	60.3	65.8
On how many evenings, did you do sports, dance or play games in which you were very active? (“4 times last week” to “5 times last week”)	59.0	60.2
During the last weekend, how many times did you do sports, dance or play games in which you were active? (“4 times last week” to “5 times last week”)	60.0	66.7
Which one of the following describes you best for the last 7 days? (“I quite often did physical things in my free time” to “I very often did physical things in my free time”)	59.9	70.2

Figure 11 illustrates scores on the Physical Education Class Activity Level scores by the specific BMI group (i.e., normal, overweight, obese) for 4th and 5th grade students. Among all students, the greatest percentage were in the most active group (i.e., “quite often” to “always”).

Figure 11. Physical Education Class Activity Level by BMI Group, Spring 2009.

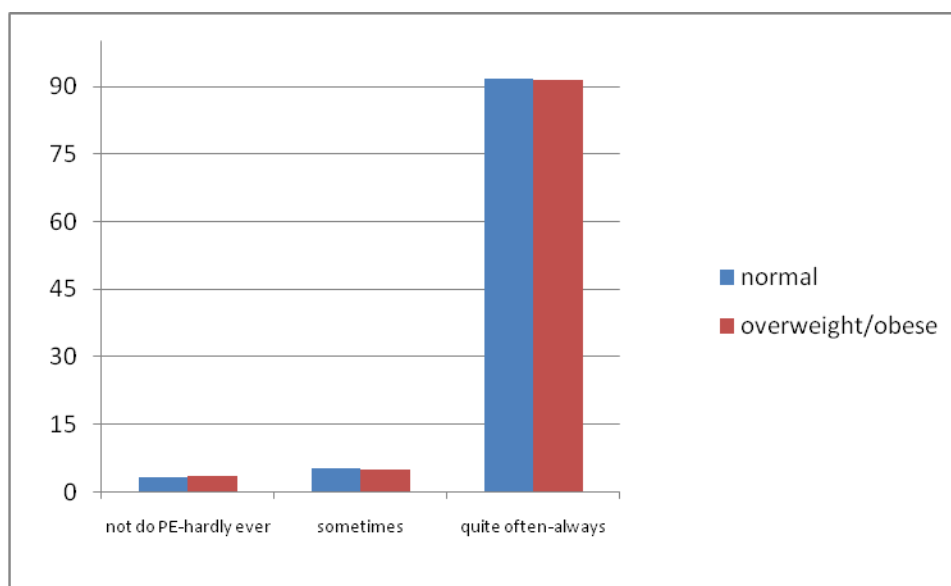
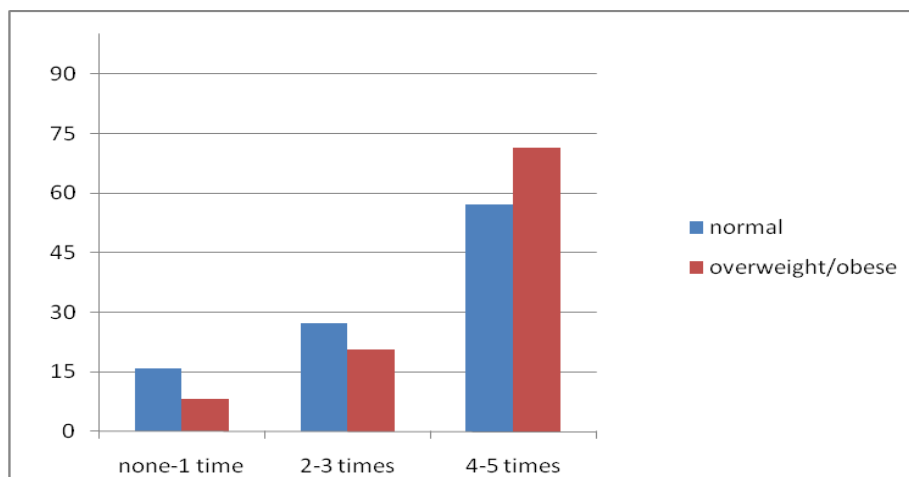


Figure 12 highlights the After School Activity Level scores by the BMI group for 4th and 5th grade students. Generally, students who were in the normal BMI group engaged in after school activities four to five times in the past week; in addition, a greater percentage of students who were considered at-risk for overweight/overweight engaged in after school activities four to five times in the past week.

Figure 12. After School Activity Level by BMI Group, Spring 2009.



Evening Activity Level scores by BMI group for 4th and 5th grade students are illustrated in Figure 13. Among students in both BMI groups (i.e., “normal” and “at-risk/overweight”), the majority engaged in evening activities four to five times in the previous week.

Figure 13. Evening Activity Level by BMI Group, Spring 2009.

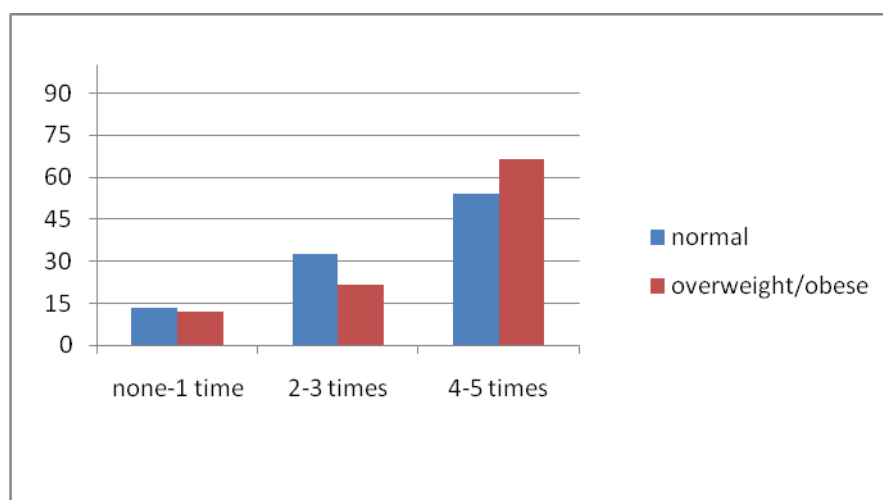
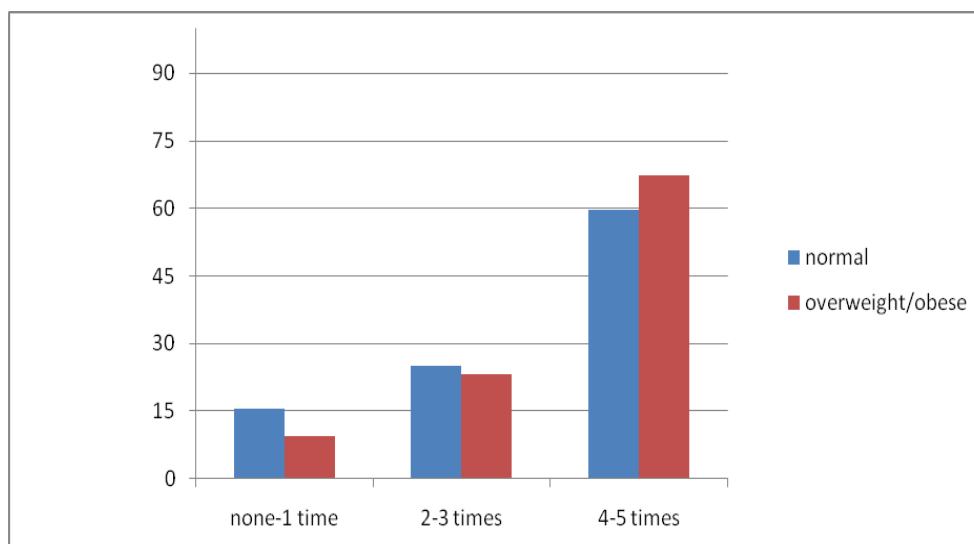


Figure 14 points out the Weekend Activity Level scores by BMI group. Among students in both BMI groups (i.e., “normal” and “at-risk/overweight”), the majority engaged in activities four to five times during the week-end.

Figure 14. Weekend Activity Level by BMI Group, Spring 2009.



Pedometer Counts

Pedometers were worn by 4th and 5th grade students for a total of four days. Average steps per day for this age group are 11,000 to 14,000 steps each day (President's Council on Physical Fitness and Sports, 2002).

There were significant differences in pedometer steps by group and gender. Figure 15 illustrates average daily pedometer steps by gender for both 4th and 5th grade students at eight schools (i.e., 67% of participating schools). Significant differences were found between boys and girls on Day 1 and Day 4. Overall, boys had higher average daily pedometer steps than girls.

Figure 15. Daily Pedometer Steps by Gender, Spring 2009.

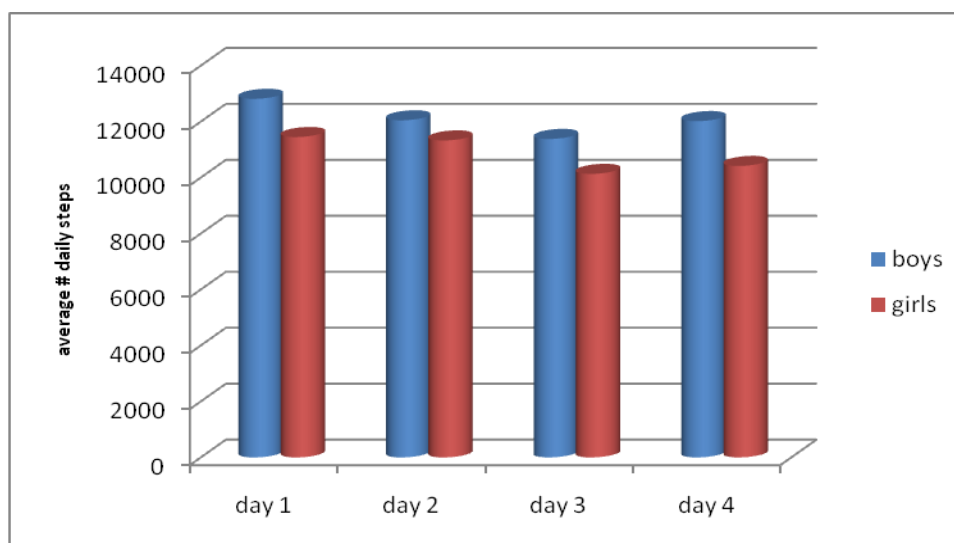


Figure 16 illustrates average daily pedometer steps by the BMI group (i.e., “normal”, “at-risk for overweight/overweight”) for both 4th and 5th grade students for eight schools. For three of the four days, students who were in the normal BMI group had a higher pedometer step rate than the at-risk for overweight/ overweight BMI groups. However, the differences were small between the average daily number of steps and the BMI groups across the four days and were not statistically significant.

Figure 16. Daily Pedometer Steps by BMI Group, Spring 2009.

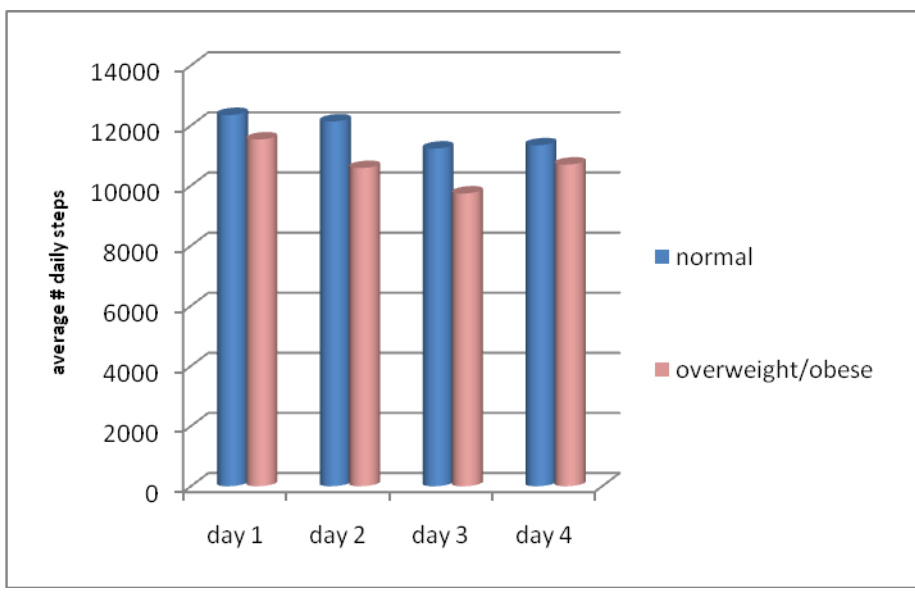


Figure 17 illustrates average daily pedometer steps by grade for eight schools. For two of the four days, 5th grade students had a higher daily pedometer step rate than 4th grade students, although it was statistically non-significant.

Figure 17. Daily Pedometer Steps by Grade, Spring 2009.

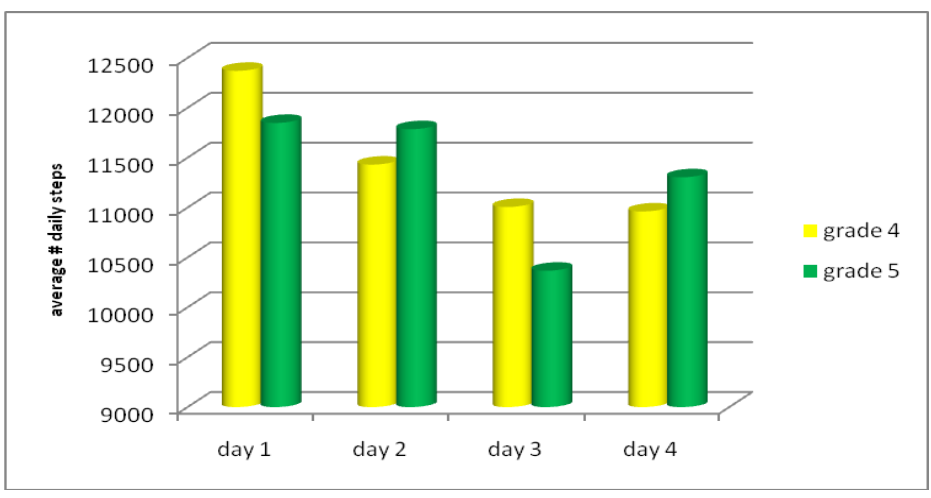
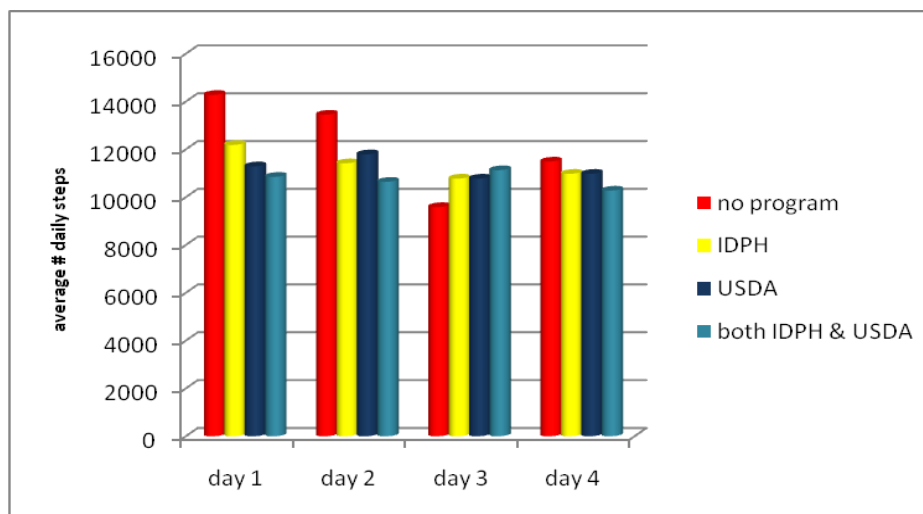


Figure 18 illustrates average daily pedometer steps by the program intervention group (i.e., no program, IDPH, USDA, both IDPH and USDA) for 4th and 5th grade students for eight schools. Differences between the groups were not statistically significant.

Figure 18. Daily Pedometer Steps by Group, Spring 2009.

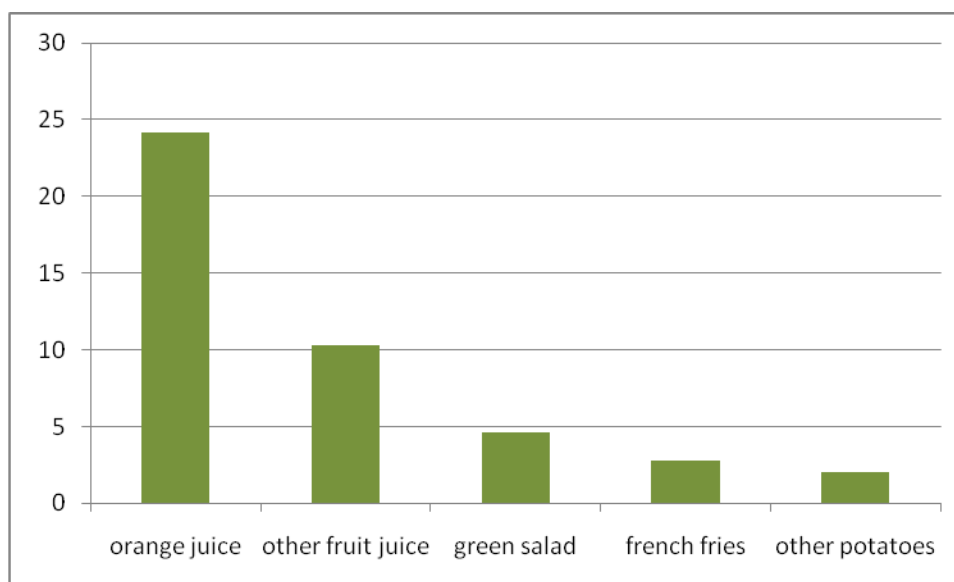


Youth Fruit and Vegetable Consumption

Fruit and Vegetable Frequency Survey. Fruit and vegetable consumption was measured by child self-report on the Fruit and Vegetable Frequency Survey. The measure was developed specifically for younger children (Cullen & Baranowski, 2003). The seven survey items evaluate children's frequency of consumption from "Never" to "4 times per day" for each food item.

At the Spring 2009 assessment, 24.2 percent of Iowa 4th and 5th grade students drank orange juice at least once each day and 10.3 percent of children drank other 100% fruit juice at least once daily; 4.6 percent ate green salad at least once daily; 2.8 percent ate French fries at least once daily; and 2 percent ate mashed, baked, or boiled potatoes at least once daily (Figure 19).

Figure 19. Daily Food Frequency, Spring 2009.



An almost equivalent percent of boys and girls drank orange juice less than once daily (i.e., boys 64.8%, girls 69.1%, respectively (Figure 20).

Figure 20. Frequency of Daily Orange Juice Consumption by Gender, Spring 2009.

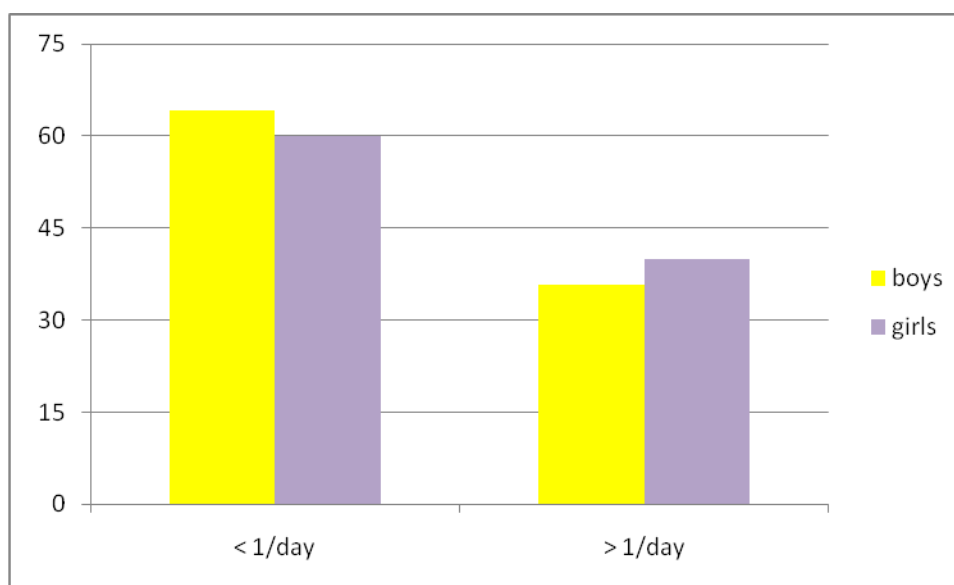
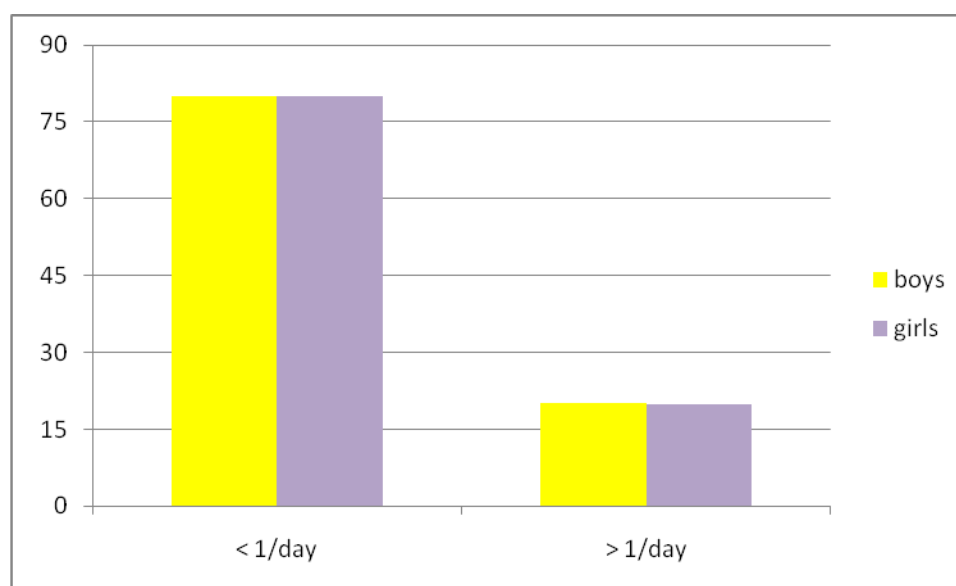


Figure 21 illustrates that an almost equivalent percent of boys and girls drank 100% fruit juice (other than orange juice) less than once daily (i.e., boys 75.3%, girls 76%). According to a study in the *Archives of Pediatrics & Adolescent Medicine* (2008), children ages 2 to 11 years old who daily consume 100% juice have better nutrient intake without an increased risk for overweight or obesity. In an analysis of data from the National Health and Nutrition Examination Survey (1999-2002), the juice

consumption of children 2 to 11 years of age was evaluated. Among this group of children, the average daily juice consumption was 4.1 ounces. Compared with children who did not drink 100% juice, those who did had significantly higher intakes of energy, carbohydrates, vitamins C and B₆, potassium, riboflavin, magnesium, iron, and folate; intakes of total fat, saturated fatty acids, discretionary fat, and added sugar were significantly lower. Compared with nonconsumers, children who drank 100% juice also consumed significantly more servings of total whole fruit.

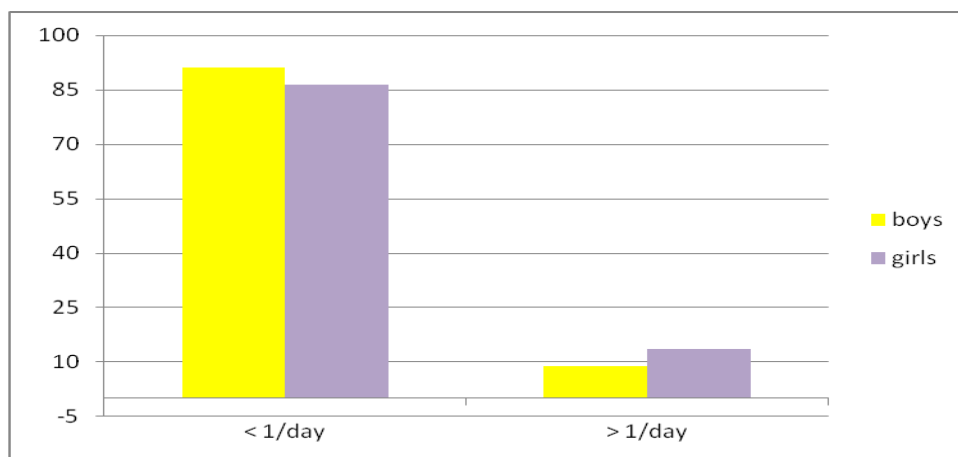
According to a recent study (Nicklas, et al., 2010), teens who drank 100 percent fruit juice have more nutritious diets overall compared to non-consumers. Among adolescents ages 12 to 18 year that drank any amount of 100 percent fruit juice had lower intakes of total dietary fat and saturated fat and higher intakes of key nutrients, including Vitamins C and B₆, folate, potassium and iron. Those who drank greater than six ounces of 100 percent juice a day also consumed more whole fruit and fewer added fats and sugars. Milk consumption was not affected by juice intake. In addition, the study found no association between 100 percent fruit juice consumption and weight status in the nearly 4,000 adolescents examined – even among those who consumed the most juice.

Figure 21. Frequency of Daily 100% Juice Consumption by Gender, Spring 2009.



At the Spring 2009 assessment, an almost equivalent percent of boys and girls ate green salad less than once daily (i.e., boys 92.9%, girls 88.8%) (Figure 22).

Figure 22. Frequency of Daily Green Salad Consumption by Gender, Spring 2009.



An almost equivalent percent of boys and girls ate French fries less than once daily (i.e., boys 89%, girls 92.7%, respectively) (Figure 23).

Figure 23. Frequency of Daily French Fry Consumption by Gender, Spring 2009.

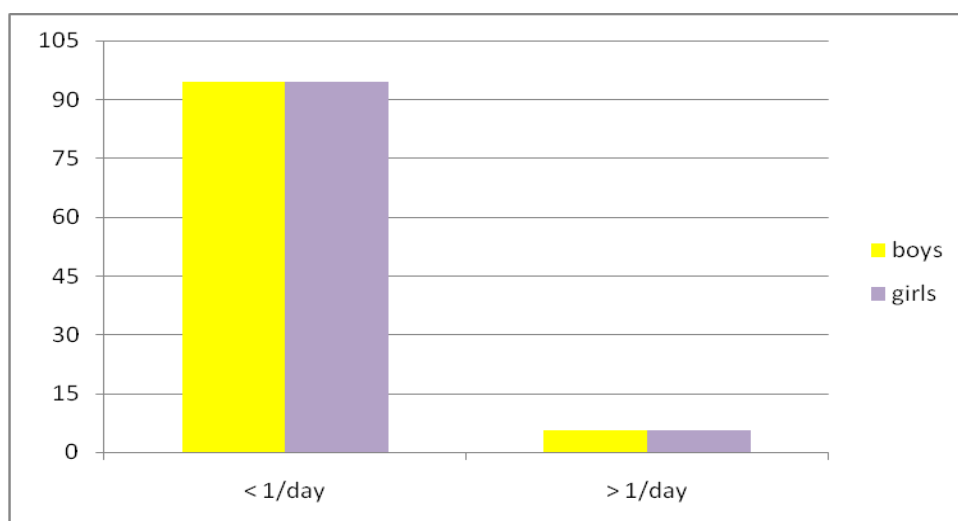
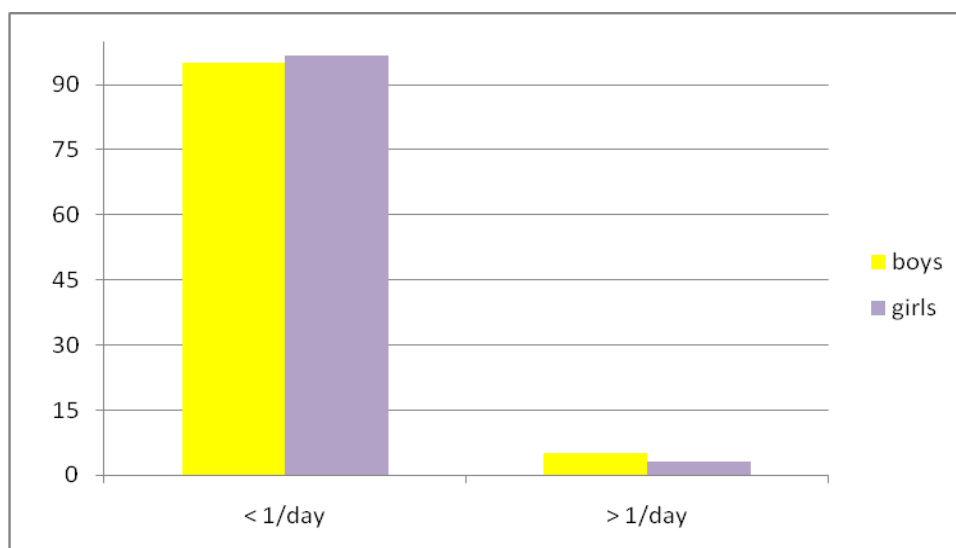


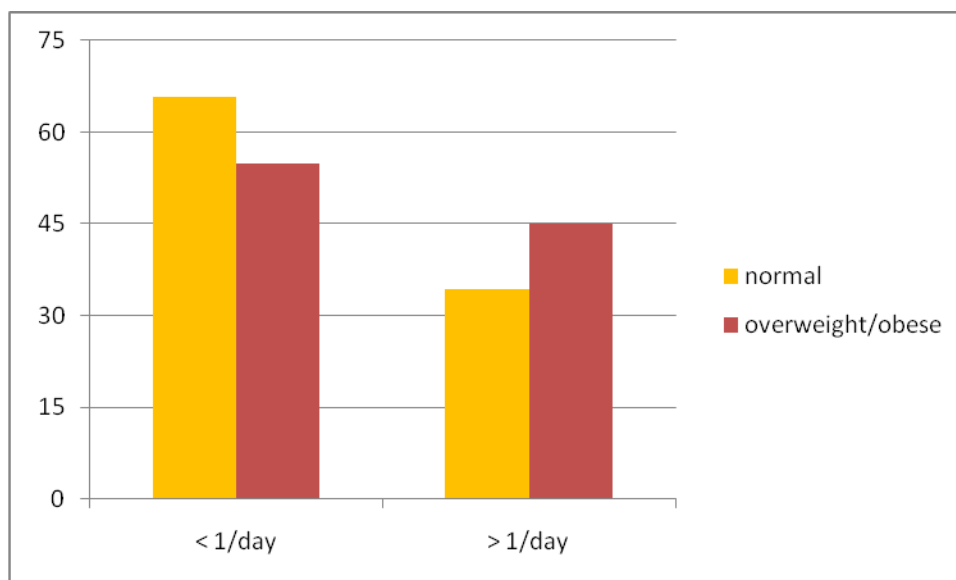
Figure 24 illustrates that an almost equivalent percent of boys and girls ate baked, boiled, or mashed potatoes less than once daily (i.e., boys 88.2%, girls 90.1%, respectively).

Figure 24. Frequency of Daily Potato Consumption by Gender, Spring 2009.



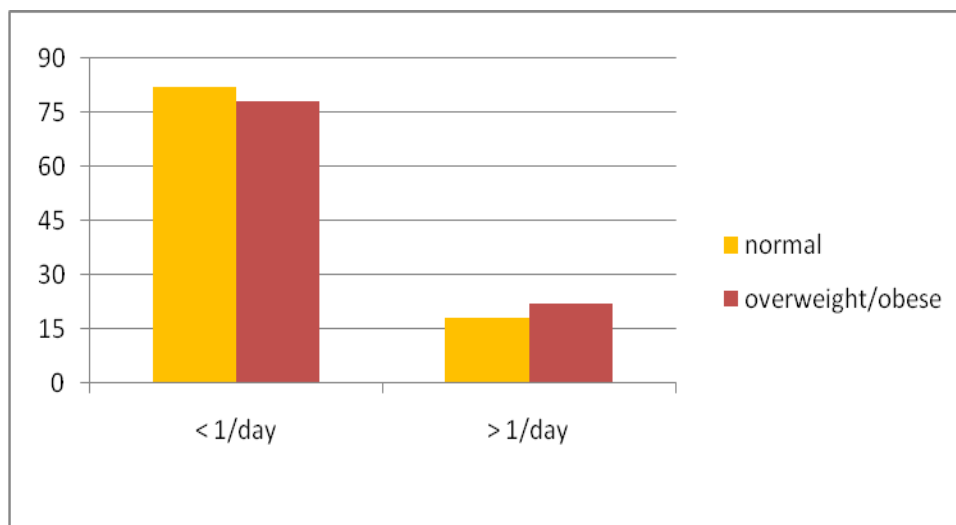
At the Spring 2009 assessment, an almost equivalent percent of children across the BMI groups (i.e., “normal”, “overweight/obese”) drank orange juice less than once daily (Figure 25).

Figure 25. Frequency of Daily Orange Juice Consumption by BMI Group, Spring 2009.



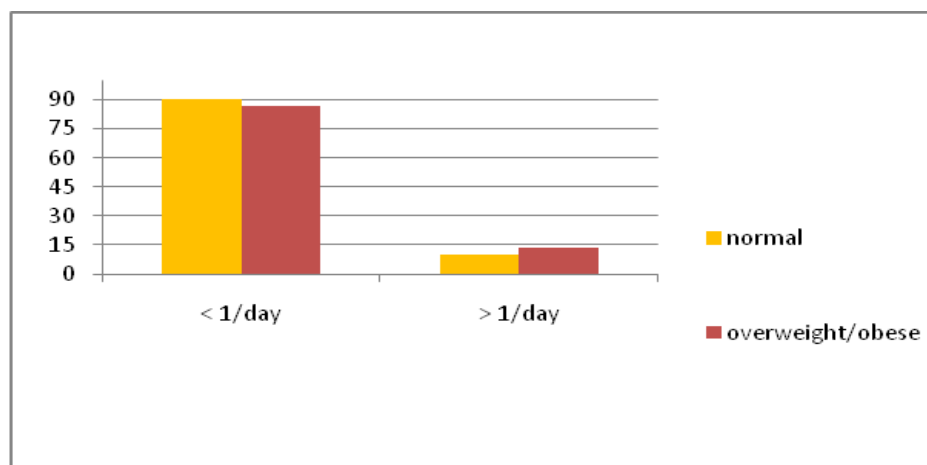
A similar percentage of children across the BMI groups drank 100% fruit juice (other than orange juice) less than once daily (Figure 26).

Figure 26. Frequency of Daily 100% Fruit Juice Consumption by BMI Group, Spring 2009.



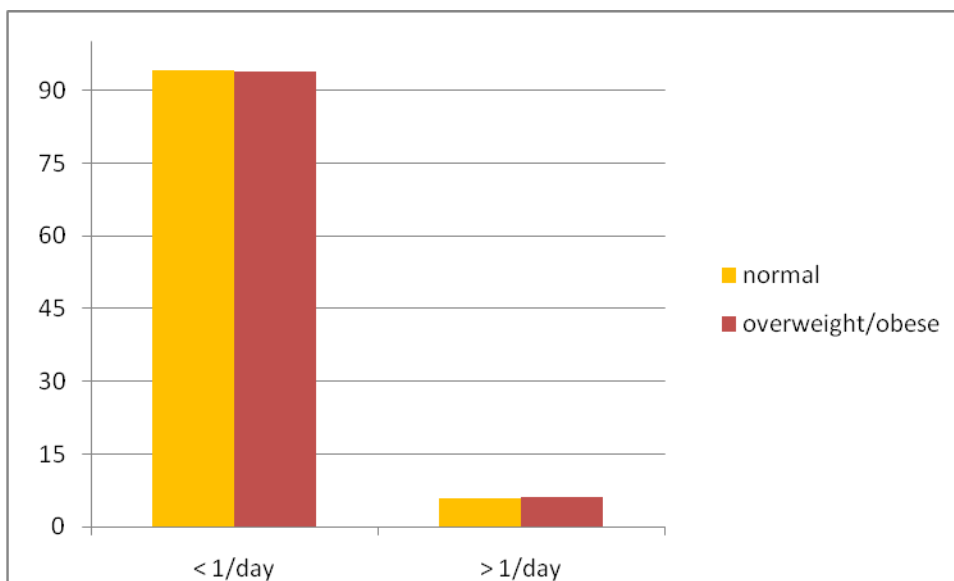
At the Spring 2009 assessment, an almost equivalent percent of children across the three BMI groups ate green salad less than once daily (i.e., normal 64.6%, overweight 15.8%, obese 19.5%) (Figure 27).

Figure 27. Frequency of Daily Green Salad Consumption by BMI Group, Spring 2007



Among both normal (i.e., 94.1%) and overweight/obese (i.e., 93.9%) children, most reported consuming French fries less than once daily (Figure 28).

Figure 28. Frequency of French Fry Consumption by BMI Group, Spring 2009.



At the Spring 2009 assessment, an almost equivalent percent of children across the three BMI groups (i.e., normal, overweight, obese) ate baked, boiled, or mashed potatoes (i.e., 64.4%, 16.4%, 19.1) less than once daily (Figure 29).

Figure 29. Frequency of Daily Potatoes Consumption by BMI Group, Spring 2009.

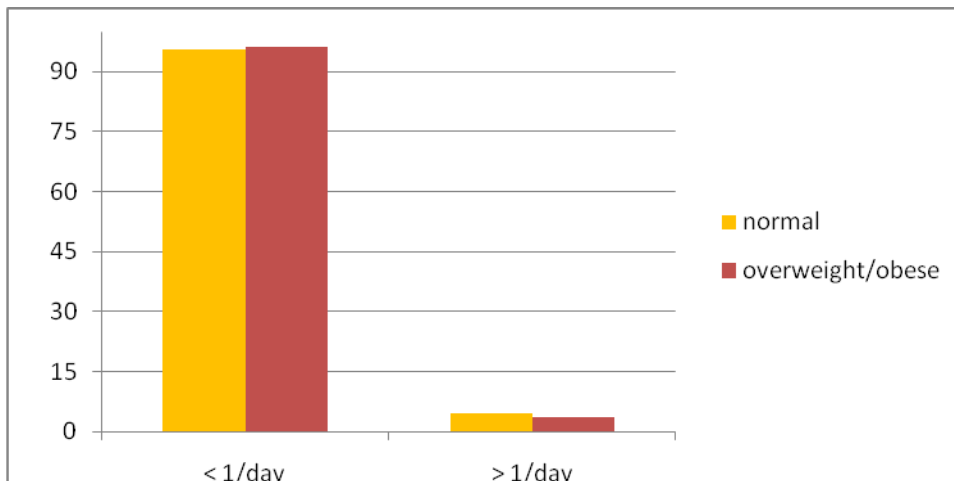


Table 5 illustrates scores on the fruit and vegetable frequency measure. A significant difference was found in the frequency of drinking 100% orange or grapefruit juice; students in the group receiving the IDPH intervention reported drinking juice more frequently than students in the other groups.

Table 5. School-level Fruit and Vegetable Consumption by Group, Spring 2009

	No Program	IDPH	USDA	Both USDA & IDPH
In the past month, about how often did you:				
Drink 100% orange juice or grapefruit juice? *	1.01	1.40	.85	1.09
Drink 100% fruit juice not counting fruit drinks? *	.98	.56	.47	.71
Eat green salad?	.40	.50	.34	.34
Eat French fries or fried potatoes?	.28	.30	.42	.30
Eat baked, boiled or mashed potatoes?	.26	.31	.25	.27

* statistically significant

Table 6 illustrates scores on the servings of fruits and vegetables. A significant difference was found on the servings of fruit; students in the group receiving the IDPH intervention reported more servings of fruit than students in the other groups. A significant difference was also found on the servings of vegetables; students in the group receiving the IDPH intervention reported more servings of vegetables than students in the other groups.

Table 6. School-level Fruit and Vegetable Servings by Group, Spring 2009.

	No Program	IDPH	USDA	Both USDA & IDPH
Not counting salad or potatoes, how many servings of vegetables do you eat*	1.19	1.54	1.26	1.17
Not counting juices how many servings of fruit do you eat*	1.63	1.78	1.56	1.33

* statistically significant

Youth Fruit and Vegetable Preferences

The survey included 17 questions to measure preferred fruit items, (e.g., apples, kiwis, carrots, spinach, strawberries, and winter squash) and 17 items to measure preferred vegetable items (e.g., cucumber, green beans, lettuce, celery, and tomato). Each item was featured in the school-based curriculum. The preferences section reflected the

items featured in the intervention. The preferences scale had three response categories and were coded as follows: 1="I don't like it," 2="I like it a little," and 3="I like it a lot." A fourth response category (i.e., 0="I don't know what it is") was excluded to assess preferences.

Table 7 shows Wave 4 mean preferences scores for the fruit items; Table 8 shows Wave 4 mean preferences scores for the vegetable items. At Wave 4, apples and corn had the highest mean scores (i.e., 2.81 and 2.81). Change scores between fruit and vegetable preferences between wave 3 and wave 4 were calculated. Significant differences were found between the intervention groups for three fruit items (i.e., apricots, grapes, and plums) and two vegetable items (i.e., broccoli and cucumbers).

Table 7. Fruit item means and standard deviation*

Fruit	Mean	Standard deviation
Apple	2.81	.45
Applesauce	2.54	.70
Apricot	1.69	.78
Banana	2.62	.62
Cantaloupe	2.27	.84
Fruit cocktail	2.13	.83
Grapes	2.78	.51
Kiwi	2.43	.77
Orange	2.62	.63
Mango	2.00	.87
Peach	2.35	.80
Pear	2.45	.75
Pineapple	2.43	.78
Plum	1.90	.87
Strawberry	2.68	.64
Tangerine	2.22	.86
Watermelon	2.72	.60

*4th and 5th grade students, Spring 2009

Table 8. Vegetable item means and standard deviation*

Vegetable	Mean	Standard deviation
Avocado	1.53	.77
Potato	2.54	.69
Pepper	1.90	.86
Broccoli	2.17	.85
Carrots	2.57	.66
Cauliflower	2.07	.88
Celery	2.10	.85
Coleslaw	1.77	.89
Corn	2.81	.48
Cucumber	2.14	.88
French fries	2.73	.55
Green beans	2.35	.79
Lettuce	2.47	.76
Green peas	1.96	.88
Sweet potato	2.04	.88
Spinach	1.65	.81
Tomato	1.91	.89

*4th and 5th grade students, Spring 2009

Tables 9 and 10 display fruit and vegetable preference changes from Fall 2007 to Spring 2009 for fifth grade students only. Results indicate that preferences increased for at least six fruit items and for six vegetable items. 56% of fifth grade students experienced a positive change with respect to tangerines from baseline to the Spring 2007 assessment. 41% of fifth grade students experienced a positive change with respect to peppers (green) from baseline to the Spring 2007 assessment.

Table 9. Fruit preference change*

Fruit	N	% change
Tangerine	88	56
Mango	72	46
Kiwi	68	36
Fruit Cocktail	53	30
Cantaloupe	55	29
Pineapple	48	24

baseline to wave 4

*5th grade students, Spring 2009

Table 10. Vegetable preference change*

Vegetable	N	% change
Pepper	71	42
Potato	59	29
Cauliflower	58	29
Cucumber	52	28
Celery	55	27
Broccoli	48	24

baseline to wave 4

*5th grade students, Spring 2009

Summary and Conclusions

Across the U.S., there is an epidemic of childhood overweight. National statistics show that almost one-third of U.S. children are at risk for overweight or obesity (Ogden, Carroll, & Flegal, 2008). Childhood overweight pervades all sectors of society regardless of race, education, or income. The current trajectory of the problem will affect the health of the U.S. population for decades to come, incurring substantial costs to the health care system. Among the 3rd, 4th, and 5th grade Iowa youth participating in the project who were measured during the Spring 2009 assessment (954 students), 61.2% had a normal BMI; 23% were considered at risk for overweight; and 15.8% were considered overweight.

The purpose of the current project was to promote regular physical activity and healthy nutrition, as well as create an environment that supports these behaviors, essential to addressing the epidemic of overweight and obesity. The Iowa Department of Public Health (IDPH) developed and implemented a comprehensive nutrition and physical activity plan for the prevention of obesity. Schools and their respective communities across the State of Iowa participated in the nutrition and physical activity intervention. Program evaluation included consistent measures across time and followed relevant outcomes over several years.

While the results reported are encouraging they must be interpreted with caution. Data were not systematically collected during this project to determine which elements of specific programs were implemented and which dosage was delivered. Without process data, it is not possible to ascertain if the changes were due to program implementation, potentially resulting in Type I error, or other nutrition or physical activity education that occurred at the same time. A Type I error occurs when a false positive finding is accepted or concluding that there is a statistically significant change when there is none.

There were challenges that threatened the validity of some findings. It is possible that the results were statistically significant due to the large sample size. For this reason, it is important to look at both the p-value as well as the difference between pre-test and post-test scores to gauge whether the difference was meaningful.

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