Spartanburg Healthy Schools Initiative

Final Evaluation Report

June 2021

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Authors and Acknowledgments

This report was completed by Institute for the Advancement of Community Health at Furman University and the Department of Health Promotion, Education, and Behavior within the University of South Carolina Arnold School of Public Health in partnership with Partners for Active Living, Alliance for a Healthier Generation, and The Mary Black Foundation.

Background and Introduction

The Problem

Youth obesity is one of the leading public health priorities in the United States today. In 2012, the National Survey for Children's Health estimated that 39.2% of South Carolina youth ages 10 to 17 years were overweight or obese. Further, in 2013, the South Carolina Department of Health and Environmental Control estimated that 32.5% of youth ages 2 to 17 in Spartanburg County were overweight or obese, exceeding the national average of 31%. Historically, public health interventions have largely focused on individual nutrition and physical activity behavior changes to reduce youth obesity. Rates of obesity, however, remain high throughout the region, state, and nation, indicating a need for more upstream population level approaches.

Public health practitioners and researchers, and others in allied fields, such as education, have acknowledged the complex interaction of biological, social, and environmental factors that are supportive of unhealthy weight statuses among youth. Policy, systems, and environment changes have emerged as key sources of overweight and obesity prevention. Schools, in particular, have become an important setting to create healthier nutrition and physical activity environments for the prevention and reduction of youth obesity given that youth consume almost half of their daily caloric intake and spend a significant portion of their waking hours in the school environment.

The Solution

Developed and supported by the Mary Black Foundation (MBF), the Spartanburg Heathy Schools Initiative is a multi-year, multi-level intervention aimed at creating healthier school environments and empowering youth to develop lifelong healthy behaviors to prevent and reduce youth obesity in Spartanburg County, SC.

This four-year initiative provides participating schools funding, technical assistance, training, and implementation strategies that align with the Alliance for a Healthier Generation Healthy Schools Program Framework of Best Practices, with the ability to tailor the intervention to individual schools' needs and priorities. Technical assistance was provided to the schools by Partners for Active Living and the Alliance for a Healthier Generation. Grants were awarded to nine schools, including seven elementary schools and two associated middle/intermediate schools. One elementary school, Clifdale Elementary, closed during year three of the intervention.

Participating Schools

District 1	District 2	Distric 3	District 6
• Campobello Gramling (K4- 8th) • O.P. Earle Elementary (k4-8th)	• Boiling Springs Intermediate (5th grade) • Oakland Elementary (K3-4th)	• Clifdale Elementary (Closed 2019)	• Arcadia Elementary (K-5th) • Lone Oak Elementary (K-5th) • R.P Dawkins Middle (6th-8th) • Woodland Heights Elementary (K-5th)

Program Partners and Intervention Design

Mary Black Foundation

Founded in 1986, The Mary Black Foundation (MBF) invests in people and communities for improved health, wellness, and success in Spartanburg County. To date, the foundation has invested more than $58 million in Spartanburg County to achieve their vision of a thriving and connected community where diverse and educated citizens lead active and healthy lives. The Foundation prioritizes Health Equity, which it defines as existing when all people have access to opportunities to thrive, both physically and mentally, and no one is limited in achieving health and wellness because of their race, ethnicity, nationality, gender, ability, sexual orientation, age, income, or zip code. In all of MBF's work, including its two focus areas of Early Childhood Development and Healthy Eating | Active Living, achieving Health Equity is priority. As part of the Healthy Eating, Active Living focus area, MBF supports a number of initiatives in school-based settings, including the Spartanburg Healthy Schools Initiative.

Partners for Active Living

Partners for Active Living (PAL) is working to improve health and wellness throughout Spartanburg County by creating an environment and culture that fosters physical activity and healthy eating. As part of their work with schools, PAL is working to reduce the rate of childhood obesity through partnerships with schools across four districts, MBF and the Alliance for a Healthier Generation (AHG). These partnerships enable PAL to provide essential tools and resources for improving the health of Spartanburg's children, families, and community.

Using AHG's "Healthy Schools Program", PAL supports each of their partner schools through their school-based wellness committee, who lead the planning and implementation. Each school selects evidence-based strategies based on what is important and achievable for their school.

Alliance for a Healthier Generation

The Alliance for a Healthier Generation believes every child deserves a healthy future. Its evidence-based Healthy Schools Program provides onsite training, technical assistance and support, access to a team of national experts, and an unparalleled digital platform with tools, trainings and resources to empower wellness leaders to implement policies and practices to create and sustain a healthy school where students and staff can thrive. The Healthy Schools Program Framework of Best Practices identifies specific criteria for a healthy school environment and serves as a guide for policy and practice change. It aligns with the 2017 School Health Index, created by the Centers for Disease Control and Prevention, which reflects the Whole School, Whole Community, Whole Child model. AHG's 6-Step Process is a continuous improvement model that guides wellness leaders to continuously evaluate and improve upon their school's health and wellness initiatives and learn from successes and challenges to create sustainable change. When repeated each year, it helps solidify healthy policies and practices and strengthen the culture of health within the school community.

Spartanburg Healthy Schools Initiative

During the four year initiative, school wellness coordinators participated in quarterly meetings, trainings, and received consultation and assistance provided by the technical assistance (TA) team. This team consisted of Healthier Generation's (HG) Program Manager and PAL's Healthy Kids Coordinator. HG's Program Manager provided Healthy Schools Program (HSP) training workshops, served as the HSP expert, and assisted schools in applying for the National Healthy Schools Award. PAL's Healthy Kids Coordinator provided local support for HSP implementation, assisted all school wellness coordinators in developing an Action Plan based on what is important and achievable in the school community, coordinated the quarterly meetings, met bimonthly with each school to monitor and support their progress through the 6-Step Process, and contacted each wellness coordinator at least monthly. The quarterly wellness coordinators meetings provided the opportunity for coordinators to network, learn from each other, share successes, and address challenges. The TA team was available as needed between scheduled meetings and approved all wellness funding requests, ensuring purchases addressed evidence-based action items on each school's action plan.

Evaluation Methods

Outcome Evaluation

To measure the impact of the SHSI, we developed a comprehensive evaluation plan including both school-level and student-level outcomes. To obtain these data, the evaluation team worked with each school district to develop a formal data sharing agreement. The table below outlines all measures that were collected as part of the evaluation plan. Select outcome measures with supporting findings are described in greater below.

Measure	Fall (T1)	Spring (T2)	Sample Population	Method
AHG Self-Assessment		X	All SHSI schools	School wellness team enter into Alliance database
School Environment Audit		X	All SHSI schools	Evaluation team Research Assistants
Student Nutrition Survey		X	4th-8th , All SHSI schools	School staff administer survey to students
Fitnessgram BMI and PACER	X	X	Height/weight: 1st-8th PACER: 3rd-8th, All SHSI schools	PE education teachers enter to Fitnessgram, Transferred by district personnel
Demographic (grade, race/eth, gender, etc.)		X	1st-8th , All SHSI schools	entered in Powerschools, Transferred by district
Attendance and Office Referrals		X	1st-8th , All SHSI schools	entered in Powerschools, Transferred by district
Academic Achievement		X	1st-8th , as appropriate for subject area tests	Transferred by district personnel

Alliance for a Healthier Generation School's Self-Assessment and Success Stories

In addition to helping schools set goals and track progress, the AHG self-assessment provides an overall measure of impact on creating healthier school environments through policy and practice change across a number of key measures. School success stories were captured by the PALS team to provide concrete examples of the policy, practice, and environment changes that were adopted by the participating schools during the four year initiative.

School Physical Activity and Nutrition Environment Audit

School environment audits were conducted to objectively examine schools nutrition and physical activity environments. The audit tool was developed by the USC Arnold School research team, with input from experts in school health research and evaluation. The audit consists of direct observation of common physical activity and nutrition spaces such as playgrounds, cafeteria, ball fields, etc. The audit also has document review component to look at written health and wellness policies. Audits were completed at the end of years one, two and four by trained research assistants.

Nutrition Behavior Survey

At baseline and end of Years one, two and three all 4th-8th grade students at SHSI schools completed a self-assessment of nutrition behaviors and physical activity behaviors. The questions ask students about the foods they ate, screen time, active play, etc. over the previous 24 hours. The survey was adapted from the School Physical Activity and Nutrition Survey developed by the research team at the University of Texas Houston. Surveys were administered online by schools using a Survey Monkey link.

Fitnessgram Body Mass Index and Cardiorespiratory data

Fitnessgram, developed by the Cooper Institute, provides an estimate of aerobic capacity and youth body mass index. Student height and weight and PACER lap data were collected in years one, two and three by physical education teachers twice annually, once at the beginning of the fall semester and once at the end of the spring semester for elementary schools and once at the beginning and end of fall and spring semesters for middle schools.

Key Findings

Alliance for a Healthier Generation School Self-Assessment

In 2019, seven of the nine schools participating in the Spartanburg Healthy Schools Initiative received the prestigious National Healthy Schools Award, an increase from two participating schools in 2016. Below are AHG Assessment numbers, with the first chart showing 2019 results from SHSI schools compared to all HSP schools in South Carolina and the second showing SHSI assessment results at baseline in 2016 compared to the most recent assessment in 2019. When comparing SHSI schools to all HSP schools in South Carolina, the SHSI schools performed better across all six domains, with the greatest differences between Physical Activity (20.7%) and Nutrition Services (19.4%). SHSI schools showed the greatest improvement on Employee Wellness (27.1%), followed by Smart Snacks (26.8%) and Nutrition Services (22.9%).

Table 1: Percentage of Items Fully Met on Current Assessments

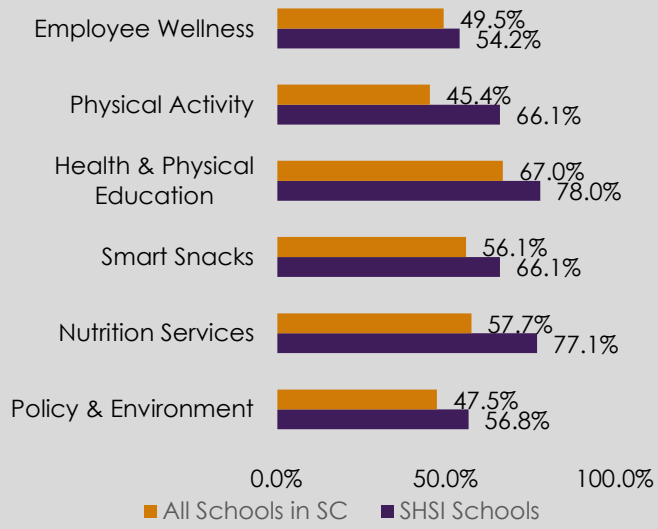
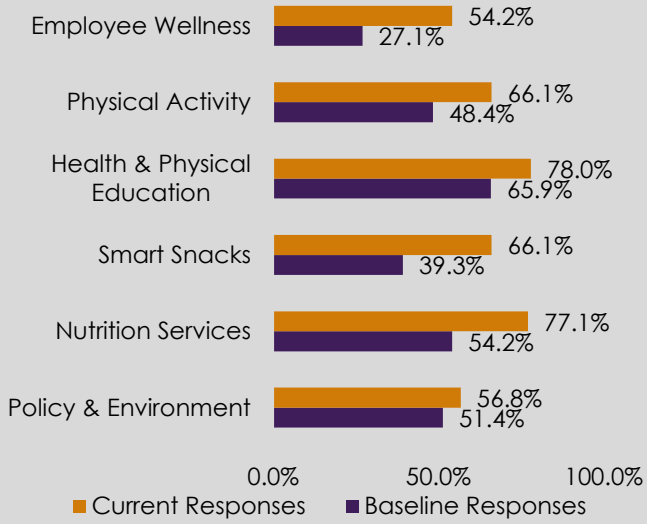


Table 2: Percentage of Items Fully Met Baseline vs Current Assessment



School Success Stories

Below are just a few examples of the policy, practice, and environment changes that schools participating in the SHSI made in Years 1-4.

- *New Kaboom playground with open community access*
- *All 9 schools launched Rethink Your Drink campaigns, 10 upgraded bottle filling stations, 1 installed an outdoor water station*
- *6 schools implemented Smarter Lunchroom techniques by adding student art, CATCH and Fuel Up To Play 60 messaging, simple healthy choices marketing tools, healthier cooking equipment, etc.*
- *All 9 schools increased student physical activity through GoNoodle and other classroom based intervention*

"Through this partnership, we have forged a deeper understanding of the lifelong benefits of health and wellness."
– Keith Burton, Principal, Lone Oak Elementary School

School Physical Activity and Nutrition Environment Audit

Results from the school environment audit from year one to year four indicate that, overall, schools implemented a number of positive changes, including decreasing access to vending machines, implementing active transit measures, healthy food education and preparation, and increasing opportunities for physical activity. The only negative change was one school no longer had bike racks or parking.

Select Postive Environment Changes Completed

1 Nature Trail installed	2 Walking Paths/tracks installed	1 Oven/stove stop installed	3 Access to Vending macines reduced	3 Bike Lane system implemented

Student Nutrition Survey

Presented below in Table 2 are results from four key indicators from the Student Nutrition and Behavior Survey in years one and three: five or more servings of fruits and vegetables, one or more sugar-sweetened beverages, one or more servings of candy, and two hours or more of screen time. Results for elementary and middle school students are presented separately. Overall, improvement was made across five of the eight indicators. Positive trends among elementary students included an increase in the number of students consuming five or more servings of fruits and vegetables and a decrease in the number of students who watched two or more hours of screen time each day. Among middle school youth, there was a decrease in the consumption of one or more sugar sweetened beverages, consumption of one or more servings of candy, and watching two or more hours of screen time. Each indicator was also analyzed separately by gender and the following differences were significant:

Year 1 KEY DATA OBSERVATIONS

- 70.59% of elementary (p=.0006) and 71.22% of middle school (p=0.005) male youth consumed one or more sugar sweetened beverages compared to 62.22% of elementary and 61.82% of middle school female youth.
- 90.02% of elementary (p=0.0024) and 93.90% of middle school (p=.0004) male youth watched two or more hours of screen time compared to 83.43% of elementary and 86.53% of middle school female youth.

Year 3 KEY DATA OBSERVATIONS

- 77.34% of elementary (p<.0005) and 81.85% of middle school (p=.0002) male youth watched two or more hours of screen time compared to 50.87% of elementary and 67.43% of middle school female youth.

Table 2: Nutrition and Screen Time Survey among Grades 4-8

	Year One	Year Three	Change
Elementary School Students	*% Yes (n)*	*% Yes (n)*	*Status*
Five or More Servings of Fruits and Vegetables	42.57% (401)	45.64% (450)	Increased
One or More Sugar Sweetened Beverages	65.86% (656)*	68.73% (677)	Increased
One or More Serving of Candy	42.91% (439)	47.07% (458)	Increased
Two or More Hours of Screen Time	86.82% (876)*	67.93% (665)*	Decreased
Middle School Students	*% Yes (n)*	*% Yes (n)*	
Five or More Servings of Fruits and Vegetables	35.42% (266)	30.68% (177)	Decreased
One or More Sugar Sweetened Beverages	66.67% (530)*	63.78% (368)	Decreased
One or More Serving of Candy	43.91% (353)	35.42% (204)	Decreased
Two or More Hours of Screen Time	90.33% (719)*	74.91% (430)*	Decreased

Chi Square Test for significance between gender, p<.0125 (a=.0125 to account for multiple comparisons)

Youth Body Mass Index, Weight Category, and Cardiorespiratory Data

Weight category data overall and by student demographics for year one and year three are presented in the following sections. Only students with data points for both fall and spring were included in the analyses for all weight category data. However, the students included in the samples from years one and three are not identical, with some youth only in year one, some youth only in year three, and some youth in both years. Therefore, interpretation of the changes in BMI weight categories from year one to three should be made very conservatively.

Weight Categories Overall and by Gender

ELEMENTARY YEAR 1 KEY DATA OBSERVATIONS

- In year one (2016-2017), there were more youth in the normal weight category (1.92%) and fewer in the obese category (1.7%) in spring 2017 compared to fall 2016. *(Table 3)* When examining movement across weight categories, these changes are from 14.22% of youth moving from a higher to a lower weight category, 74.7% remaining in the same weight category, and 11.06% moving from a lower to a higher weight category. For detailed results of changes in weight categories. (Chart 2)

- A larger percentage of female youth were in the normal weight category in both fall (5.43%) and spring (3.94%); however, there was a greater decrease from fall to spring in the percentage of male youth in the obese category (2.22%) compared to female youth (1.2%). (Table 3)

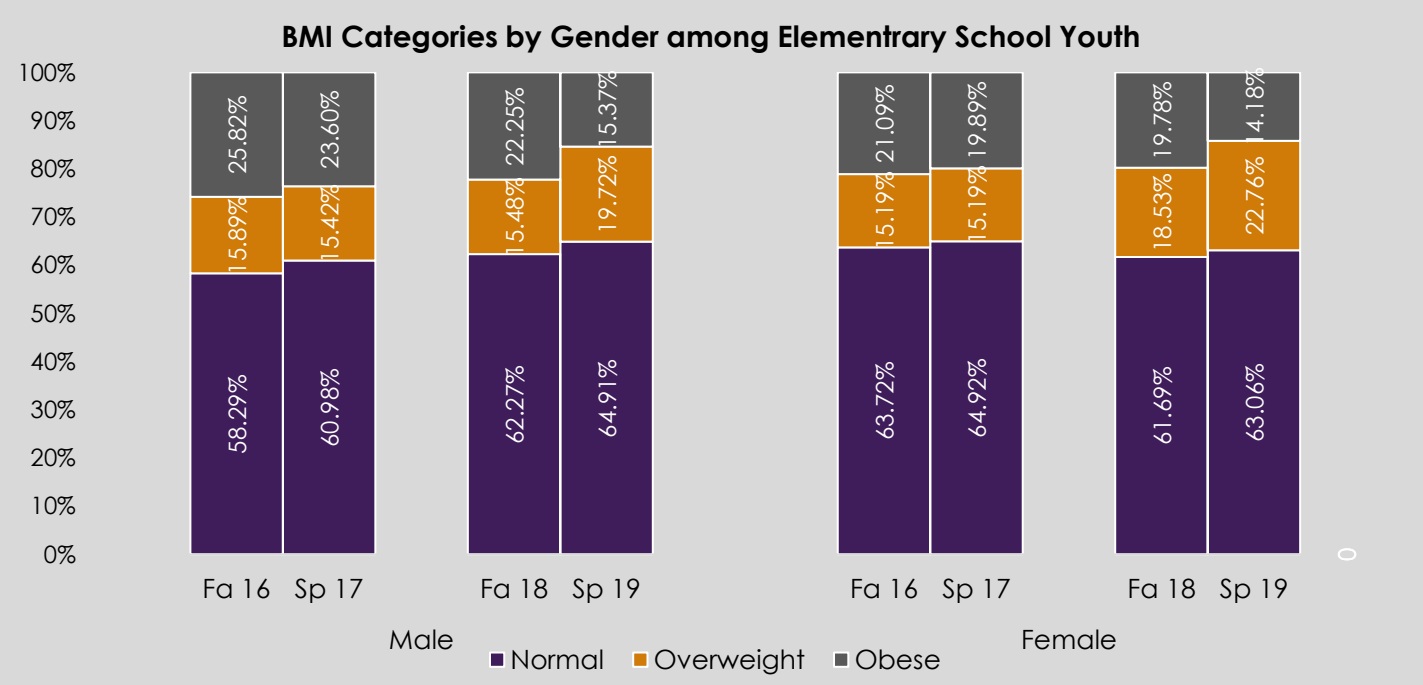
Elementary Year 3 KEY DATA OBSERVATIONS

- In year one (2018-2019), more youth were in the normal weight (2.03%) and overweight (4.23%) categories and fewer in the obese (6.26%) category in spring compared to fall. (Table 3)
- When examining movement across weight categories, these changes are the result of 11.81% of youth moving from a higher to a lower weight category, 78.41% remaining in the same weight category, and 9.79% moving from a lower to a higher weight category. For detailed results of changes in weight categories. (Chart 3)
- There was a greater percentage of male youth in the normal weight category in fall (0.58%) and spring (1.85%). here was a higher percentage of female youth in the overweight category in fall (3.05%) and spring (3.04%) and a higher percentage of male youth in the obese category in fall (2.86%) and spring (1.19%). Male youth had a greater decrease (6.88%) in the percentage of students in the obese category, compared to female youth (5.6%). (Table 3)

Table 3: BMI Weight Categories among Youth in Grades 1-5

	Fall 2016	Spring 2017	Fall 2018	Spring 2019
BMI Category Overall	% (n)	% (n)	% (n)	% (n)
Normal	61.10% (1082)	63.02% (1116)	61.99% (1039)	64.02% (1073)
Overweight	15.53% (275)	15.30 (271)	16.95% (284)	21.18% (355)
Obese	23.38% (414)	21.68% (384)	21.06% (353)	14.80% (248)
BMI Category Male				
Normal	58.29% (499)	60.98% (522)	62.27% (543)	64.91% (566)
Overweight	15.89% (136)	15.42% (132)	15.48% (135)	19.72% (172)
Obese	25.82% (221)	23.60% (202)	22.25% (194)	15.37% (134)
BMI Category Female				
Normal	63.72% (583)	64.92% (594)	61.69% (496)	63.06% (507)
Overweight	15.19% (139)	15.19% (139)	18.53% (149)	22.76% (183)
Obese	21.09% (193)	19.89% (18)	19.78% (159)	14.18% (114)

Chart 1. Change within BMI Categories by Gender in Fall 2016 and Spring 2017



MIDDLE SCHOOL YEAR 1 KEY DATA OBSERVATIONS

- Among all youth, the percentage of middle schools in the normal weight category decreased from the beginning to the end of the semester. (Table 1)
- Among middle school youth, there were slightly fewer girls in the normal weight category at the beginning of the semesters compared to male middle school youth. However, at the end the percentage of male and female youth in the normal weight category increased and was very similar. There were more male youth in the obese category compared to girls at the beginning (5.01%) and end of the semester (4.62%). (Table 4 and Chart 2)

MIDDLE SCHOOL YEAR 3 KEY DATA OBSERVATIONS

- Overall and by gender, the percentage of youth across weight categories remained relatively similar from the beginning to the end of the semester in both fall and spring among middle school youth. (Table 4 and Chart 2)
- Among middle school youth, there were fewer girls in the normal weight category at the beginning (4.94%) and end (6.49%) of the semester compared to male middle school youth. The number of male and female youth in the obese category was similar at both time points. (Table 4 and Chart 2)

Table 4: BMI Weight Categories Among Youth in Grades 6-8 at RP Dawkins

	Fall 2016	Spring 2017	Time 1 2018-2019	Time 2 2018-2019
BMI Category Overall			% (n)	% (n)
Normal	61.25% (226)	64.50% (238)	56.79% (389)	56.06% (384)
Overweight	19.24% (71)	16.80% (62)	17.66% (121)	18.50% (355)
Obese	19.5% (72)	18.70% (69)	25.55% (175)	25.50% (174)
BMI Category Male				
Normal	61.88% (125)	64.85% (131)	59.12% (214)	59.12% (214)
Overweight	16.34% (33)	14.36% (29)	15.19% (55)	15.75% (57)
Obese	21.78% (44)	20.79% (42)	25.69% (93)	25.14% (91)
BMI Category Female				
Normal	60.48% (101)	64.07% (107)	54.18% (175)	52.63% (170)
Overweight	22.75% (38)	19.76% (33)	20.43% (66)	21.67% (70)
Obese	16.77% (28)	16.17% (27)	25.39% (82)	25.50% (83)

Chart 2. Change within BMI Categories among Middle School Youth by Gender 2018-2019 at RP Dawkins

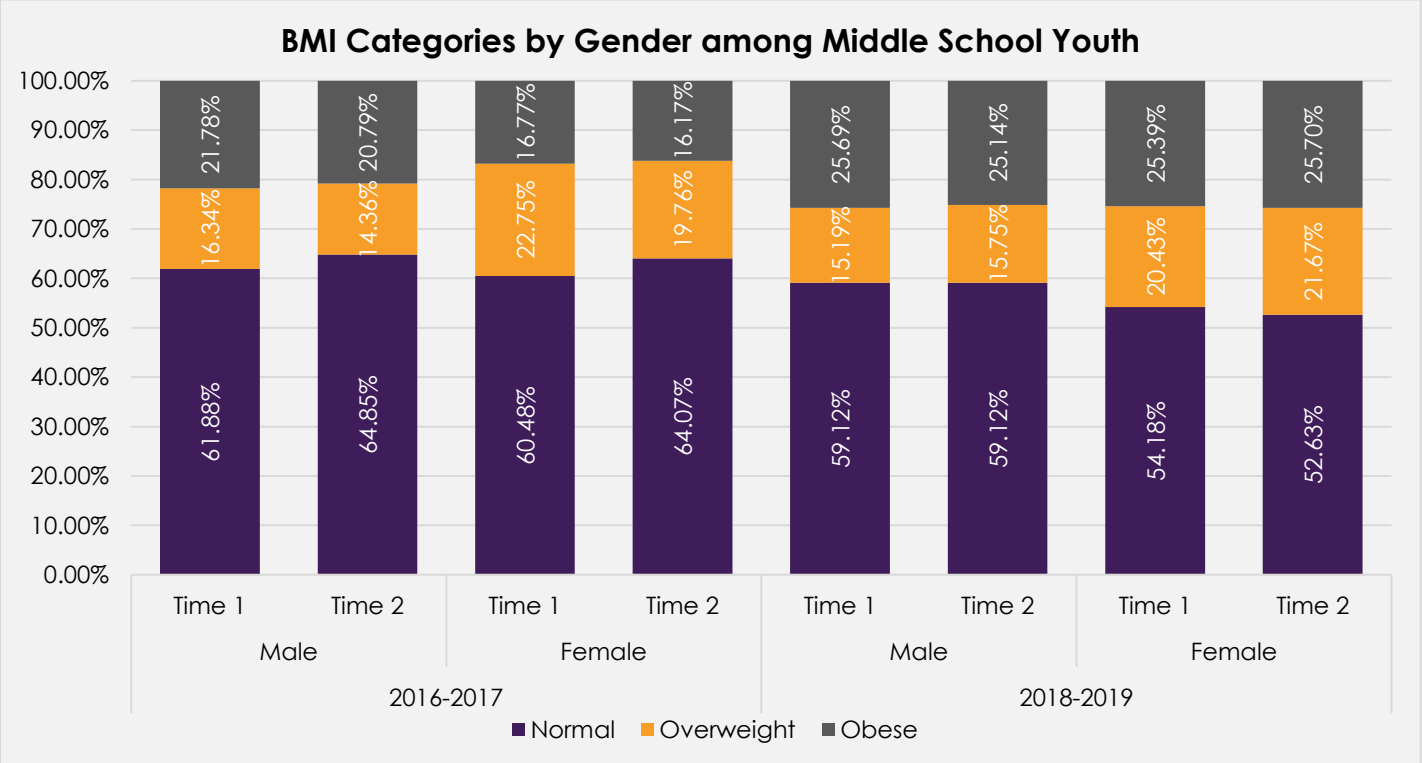


Chart 3. Change within BMI Categories among Elementary School Youth from Fall 2016 and Spring 2017

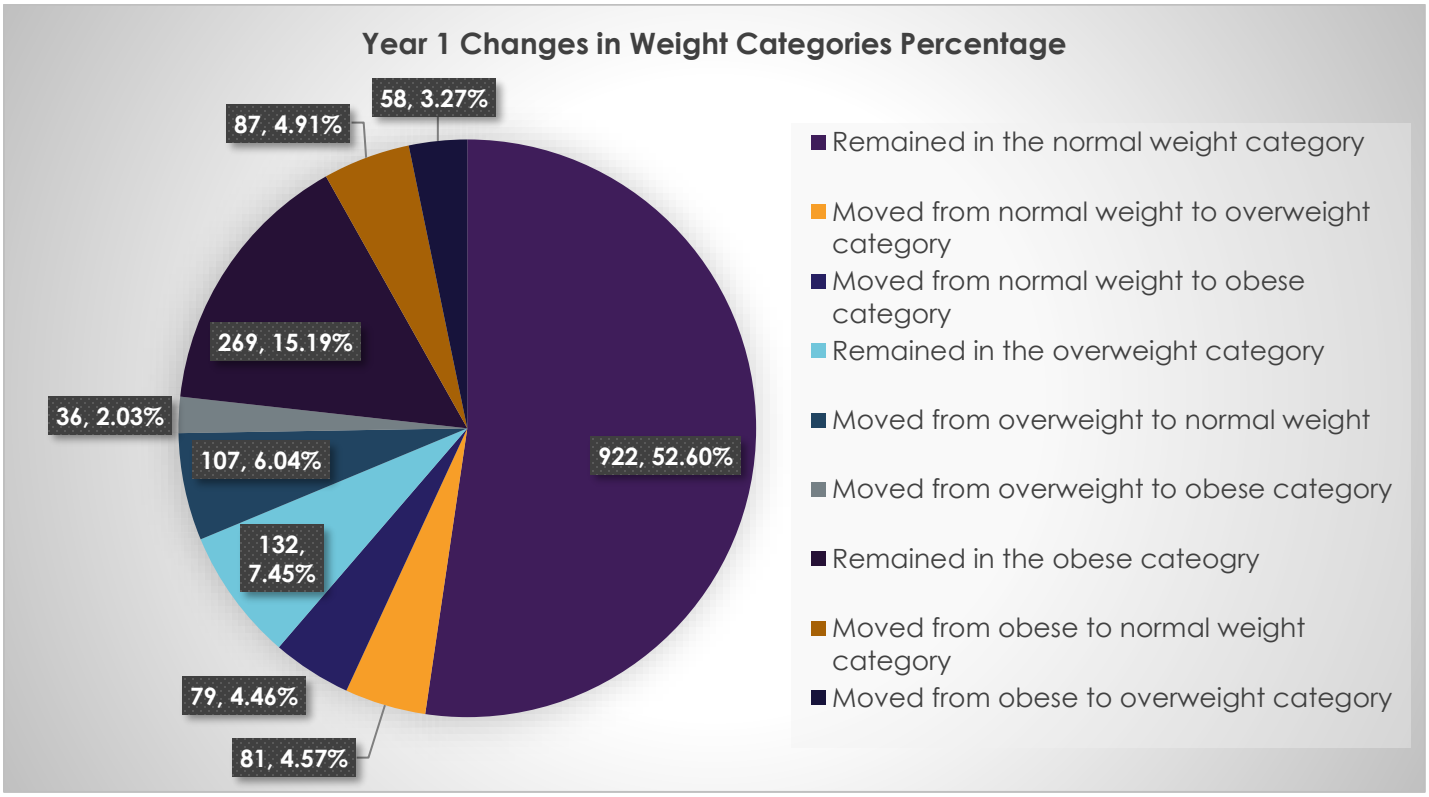
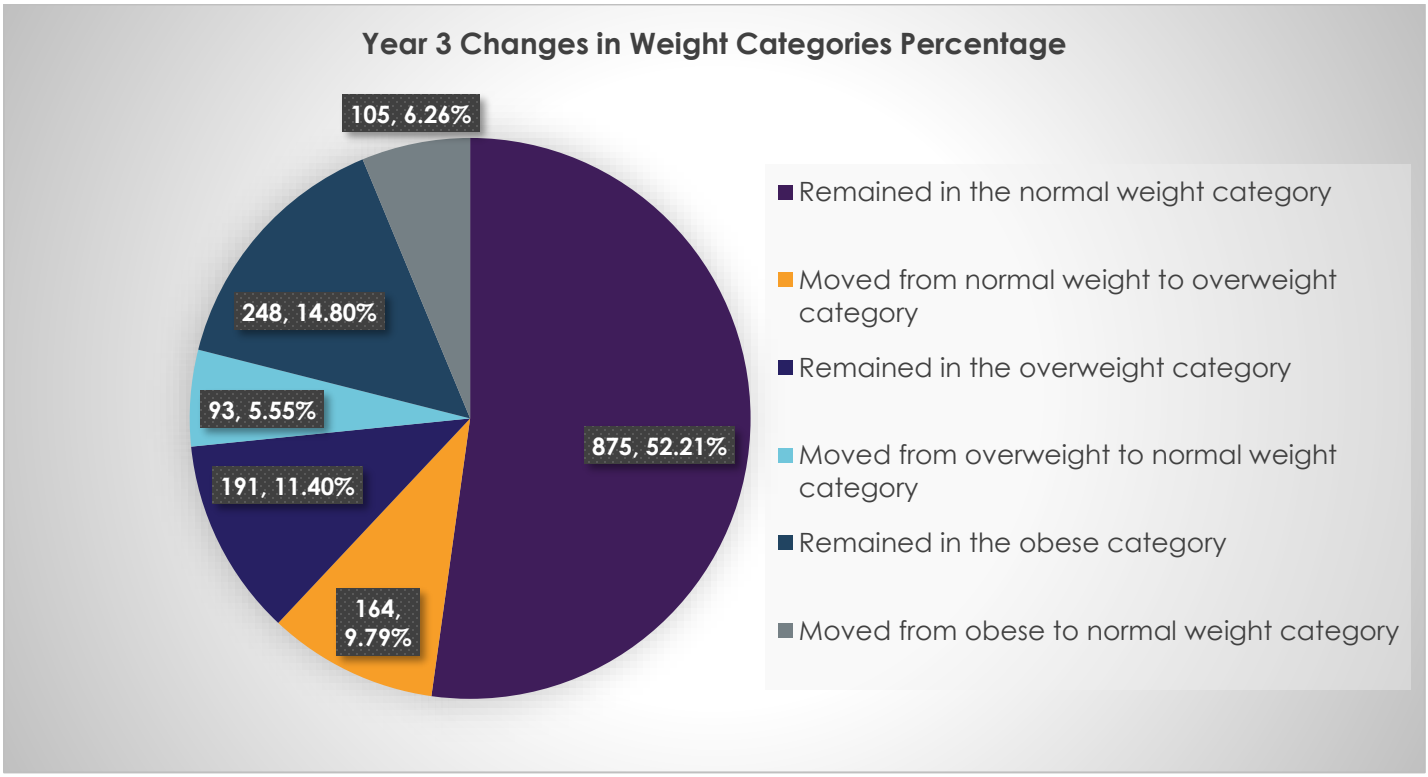


Chart 4. Change within BMI Categories among Elementary School Youth from Fall 2018 and Spring 2019



Weight Categories by Race and Ethnicity

ELEMENTARY SCHOOL YEAR 1 KEY DATA OBSERVATIONS

- There was a greater increase in the percentage of Black youth who fell into the normal category (5.1%) from fall and spring compared to youth in all other race/ethnicity groups. A larger percentage of Hispanic youth (7.64%) moved to the obese category compared to youth in the other groups. (Table 5 and Chart 5)
- Youth in the "Other" race/ethnicity category had the highest percentage of youth in the normal weight category in spring (66.67%) and White youth had the highest percentage in the normal weight category (67.05%) in the spring (Table 5 and Chart 5)

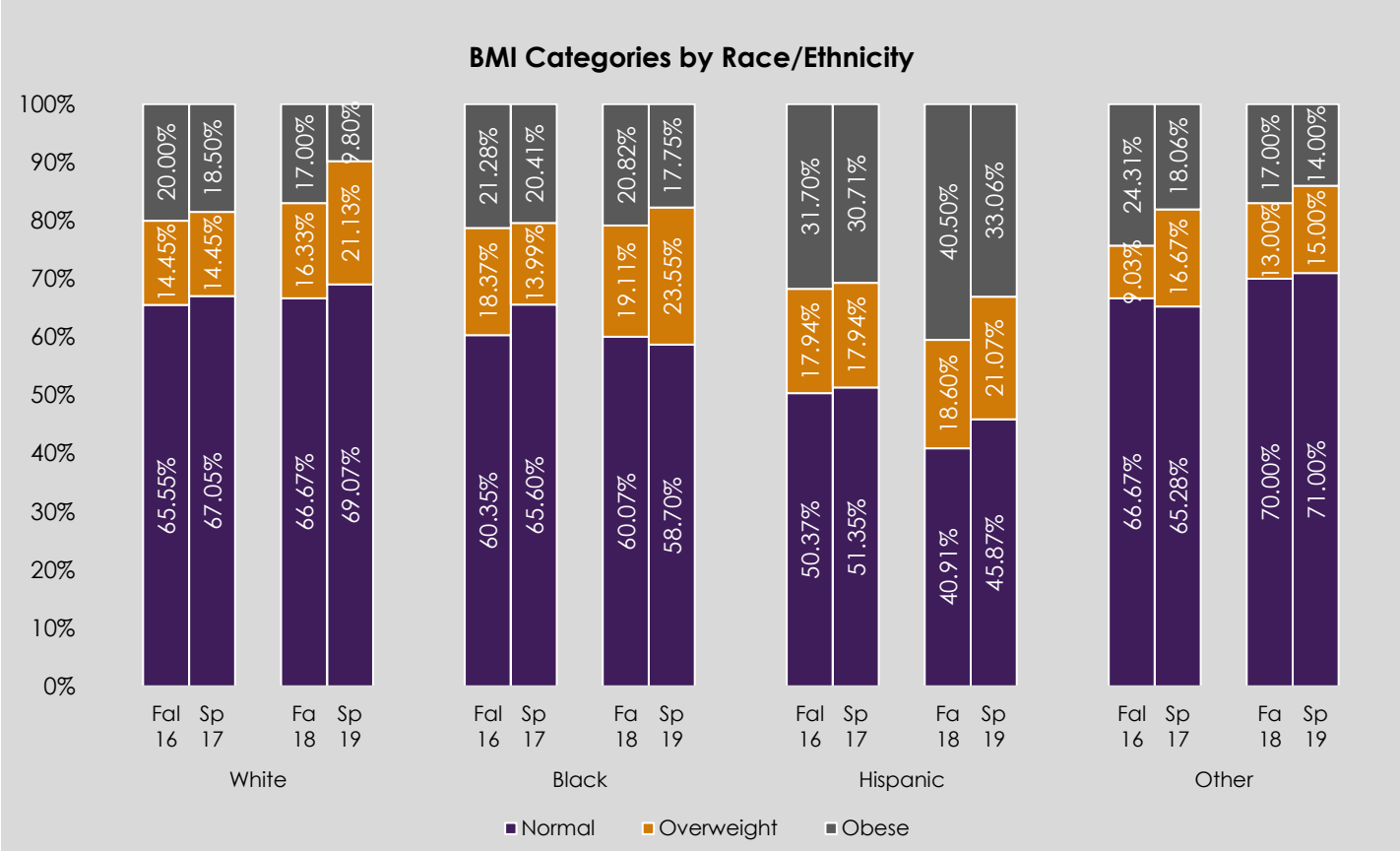
ELEMENTARY SCHOOL YEAR 3 KEY DATA OBSERVATIONS

- There was a greater decrease from fall to spring among White (7.2%) and Hispanic youth (7.44%) in the obese category compared to Hispanic youth and youth in the "Other" race categories. (Table 5 and Chart 5)
- There was a decrease in the number of Black youth (1.37%) in the normal weight category, but an increase in the percentage of White (2.4%) and Hispanic (4.96%) youth in the normal weight category. However Hispanic youth had the highest percentage of youth in the obese category in both fall (40.50%) and spring (33.06%). (Table 5 and Chart 5)

Table 5: BMI Weight Categories Among Youth in Grades 1-5 by Race/Ethnicity

	Fall 2016	**Spring 2017**	**Fall 2018**	**Spring 2019**
BMI Category White	*% (n)*	*% (n)*	*% (n)*	*% (n)*
Normal	65.55% *(567)*	67.05% *(580)*	66.67% *(694)*	69.07% *(719)*
Overweight	14.45% *(125)*	14.45% *(125)*	16.33% *(170)*	21.13% *(220)*
Obese	20.00% *(173)*	18.50% *(160)*	17.00% *(177)*	9.80% *(102)*
BMI Category Black				
Normal	60.35% *(207)*	65.60% *(225)*	60.07% *(176)*	58.70% *(172)*
Overweight	18.37% *(63)*	13.99% *(48)*	19.11% *(56)*	23.55% *(69)*
Obese	21.28% *(73)*	20.41% *(70)*	20.82% *(61)*	17.75% *(52)*
BMI Category Hispanic				
Normal	50.37% *(205)*	51.35% *(209)*	40.91% *(99)*	45.87% *(111)*
Overweight	17.94% *(73)*	17.94% *(73)*	18.60% *(45)*	21.07% *(51)*
Obese	31.70% *(129)*	30.71% *(125)*	40.50% *(98)*	33.06% *(80)*
BMI Category Other				
Normal	66.67% *(96)*	65.28% *(94)*	70.00% *(70)*	71.00% *(71)*
Overweight	9.03% *(13)*	16.67% *(24)*	13.00% *(13)*	15.00% *(15)*
Obese	24.31% *(35)*	18.06% *(26)*	17.00% *(17)*	14.00% *(14)*

Chart 5. BMI Weight Categories among Youth Grades 1-5 by Race/Ethnicity in 2016-2017 & 2018-2019



MIDDLE SCHOOL YEAR 1 KEY DATA OBSERVATIONS

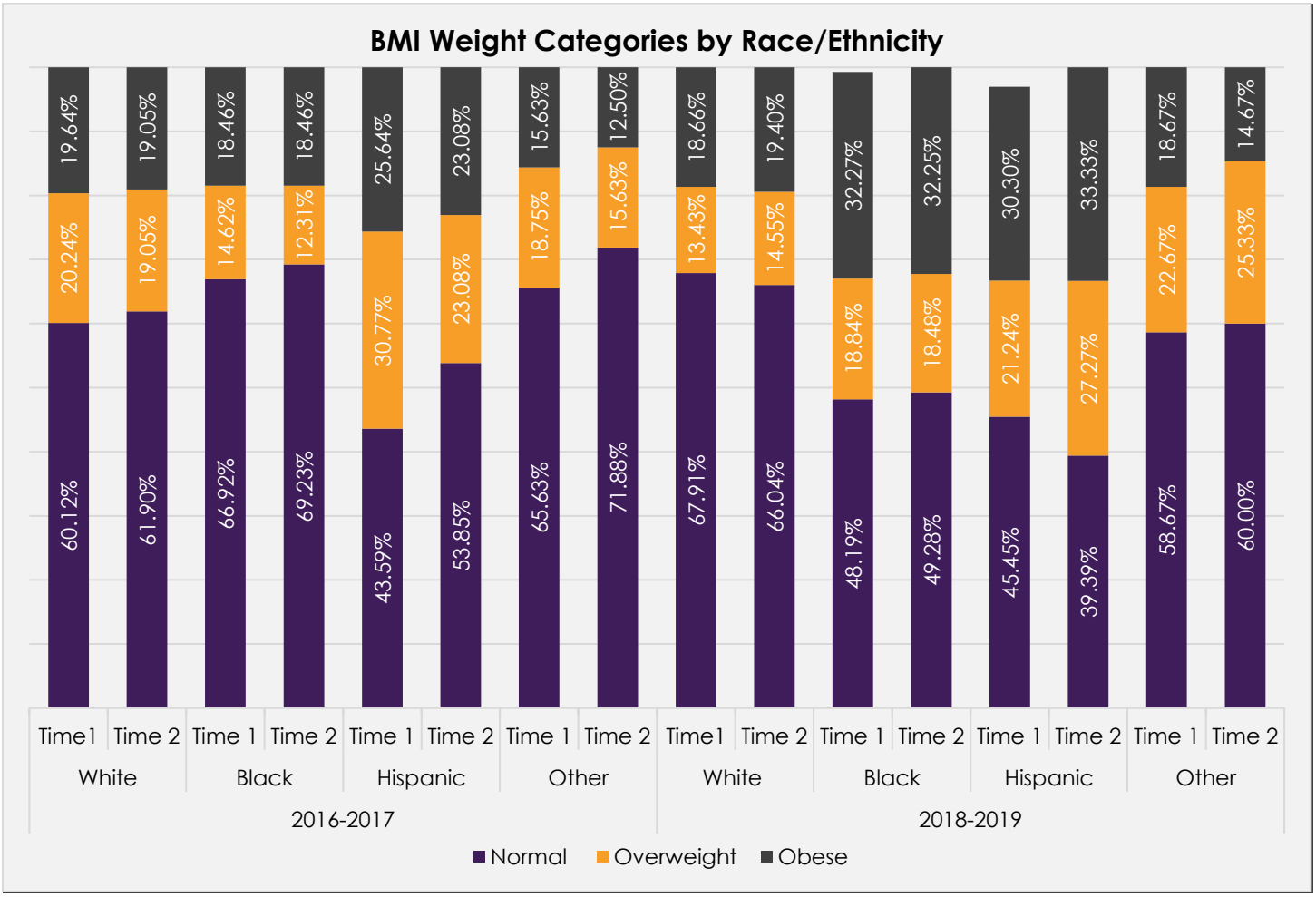
- Among Middle School youth, youth in the "Other" race category highest percentage of students in the normal weight category both at the beginning and end of each semester, however, it is important to note the small sample size. Black youth had the next highest percentage of youth in the normal weight categories at the beginning (66.92%) and end (69.23%) of the fall and spring semesters. (Table 6)
- Hispanic youth had the lowest percentage of youth in the normal weight category at the beginning (43.59%) and end (53.85%) of the semester, however, the sample size is very small. (Table 6)

MIDDLE SCHOOL YEAR 3 KEY DATA OBSERVATIONS

- Among Middle School youth, White students had the highest percentage of students in the normal weight category both at the beginning (67.91%) and end (66.04%) of each semester compared to all other race/ethnicity categories. (Table 6 and Chart 6)
- Hispanic Middle School youth had the lowest percentage of youth in the normal weight category at both the end and beginning of the semester. However, they had a similar percentage of youth in the obese category at both time points as black youth. Hispanic youth also had the largest increase in the number of students in the overweight category from beginning to end of semester. (Table 6 and Chart 6)

Table 6: BMI Weight Categories among Youth in Grades 6-8 by Race/Ethnicity at RP Dawkins 2018-2019				
	2016-2017		2018-2019	
	Time 1	Time 2	Time 1	Time 2
BMI Category White	% (n)	% (n)	% (n)	% (n)
Normal	60.12% (101)	61.90% (104)	67.91% (182)	66.04% (177)
Overweight	20.24% (34)	19.05% (32)	13.43% (36)	14.55% (39)
Obese	19.64% (33)	19.05% (32)	18.66% (50)	19.40% (52)
BMI Category Black				
Normal	66.92% (87)	69.23% (90))	48.19% (133)	49.28 (136)
Overweight	14.62% (19)	12.31% (16)	18.84% (52)	18.48% (51)
Obese	18.46% (24)	18.46 (24)	32.27% (91)	32.25% (89)
BMI Category Hispanic				
Normal	43.59% (17)	53.85% (21)	45.45%(30)	39.39% (26)
Overweight	30.77% (12)	23.08% (9)	21.24% (16)	27.27% (18)
Obese	25.64% (10)	23.08% (9)	30.30% (20)	33.33% (22)
BMI Category Other				
Normal	65.63% (21)	71.88% (23)	58.67% (44)	60.00% (45)
Overweight	18.75% (6)	15.63% (5)	22.67% (17)	25.33% (19)
Obese	15.63% (5)	12.50% (4)	18.67% (14)	14.67% (11)

Chart 6. BMI Weight Categories among Youth Grades 6-8 by Race/Ethnicity at RP Dawkins 2018-2019



Weight Categories by Lunch Status

ELEMENTARY SCHOOL YEAR 1 KEY DATA OBSERVATIONS

- There were more youth who paid full price in the normal weight category in both the fall (7.6%) and spring (4.45%) compared to youth who receive free or reduced lunch. (Table 7 and Chart 7)
- From fall 2016 to spring 2017, youth who receive free or reduce lunch had a larger increase in the percentage of youth in the normal category (3.15%) compared to full pay lunch youth. (Table 7 and Chart 7)

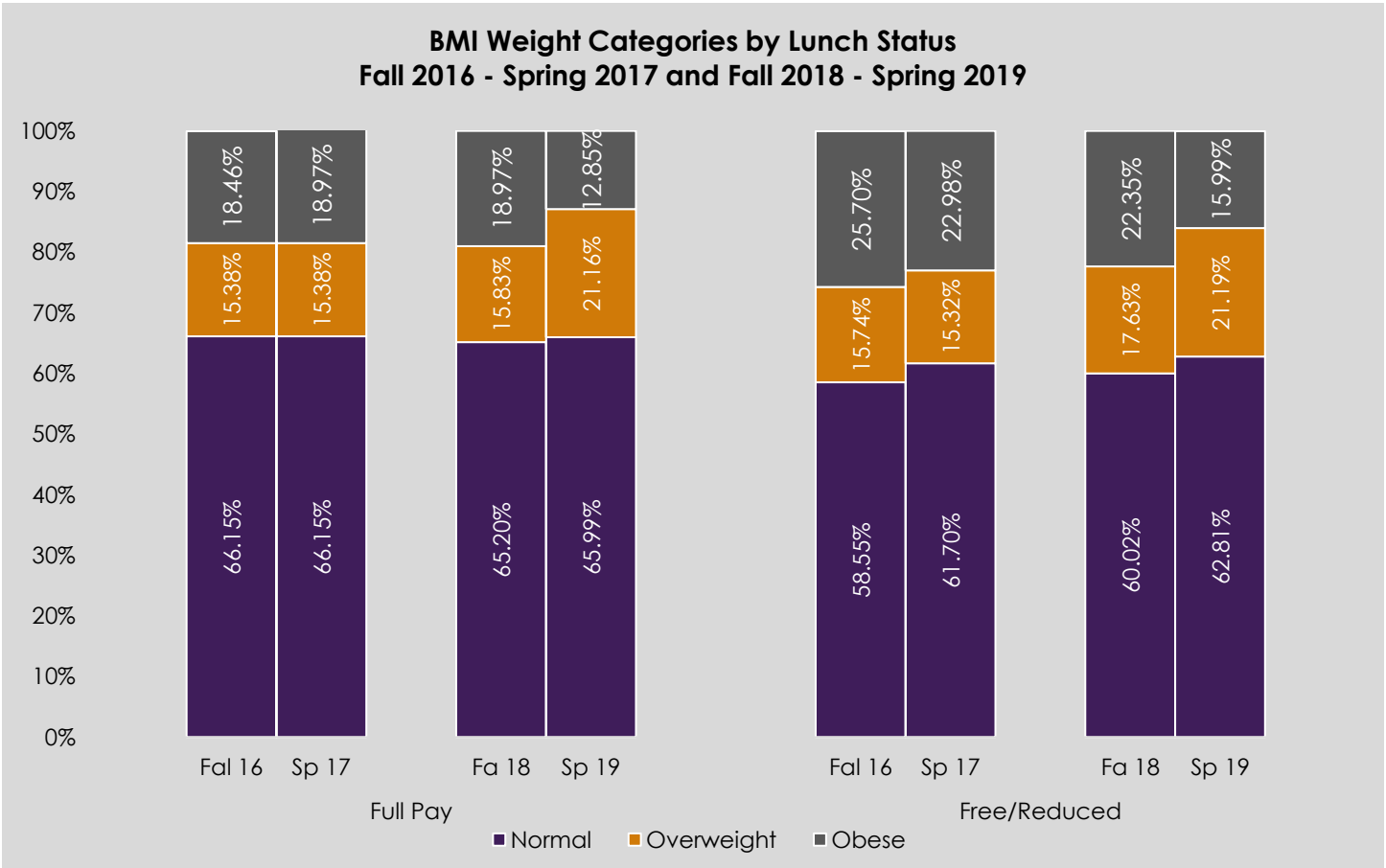
ELEMENTARY SCHOOL YEAR 3 KEY DATA OBSERVATIONS

- There were more elementary school youth who paid full price in the normal weight category in both fall (5.18%) and spring (5.18%) compared to youth who received free or reduced price lunch. (Table 7 and Chart 7).
- There was not a significant change in the number of students in the normal weight category in either lunch category student fall to spring, there was a decrease in the number of youth in the obese category among youth who received free or reduced price lunch (6.36%) and students who paid full price for lunch (6.12%). (Table 7 and Chart 7)

Table 7: BMI Weight Categories Among Youth in Grades 1-5 by Lunch Status

	Fall 2016	Spring 2017	Fall 2018	Spring 2019
Full Pay	% (n)	% (n)	% (n)	% (n)
Normal	66.15% (387)	66.15% (384)	65.20% (416)	65.99% (421)
Overweight	15.38% (90)	15.38% (90)	15.83% (101)	21.16% (135)
Obese	18.46% (108)	18.97% (111)	18.97% (121)	12.85% (82)
Free/Reduced				
Normal	58.55% (688)	61.70% (725)	60.02% (623)	60.81% (652)
Overweight	15.74% (185)	15.32% (180)	17.63% (183)	21.19% (220)
Obese	25.70% (302)	22.98% (270)	22.35% (232)	15.99% (166)

Chart 7: BMI Categories by School Lunch Status in Fall 16/Spring 17 and Fall 18/Spring 19



MIDDLE SCHOOL YEAR 1 KEY DATA OBSERVATIONS

- In the 2016-2017 school year, there were more middle school youth who received free or reduced price lunch price for lunch in the normal weight category at the beginning and end of the semester. However, the number of youth in the obese category for both lunch categories was similar at both time points.

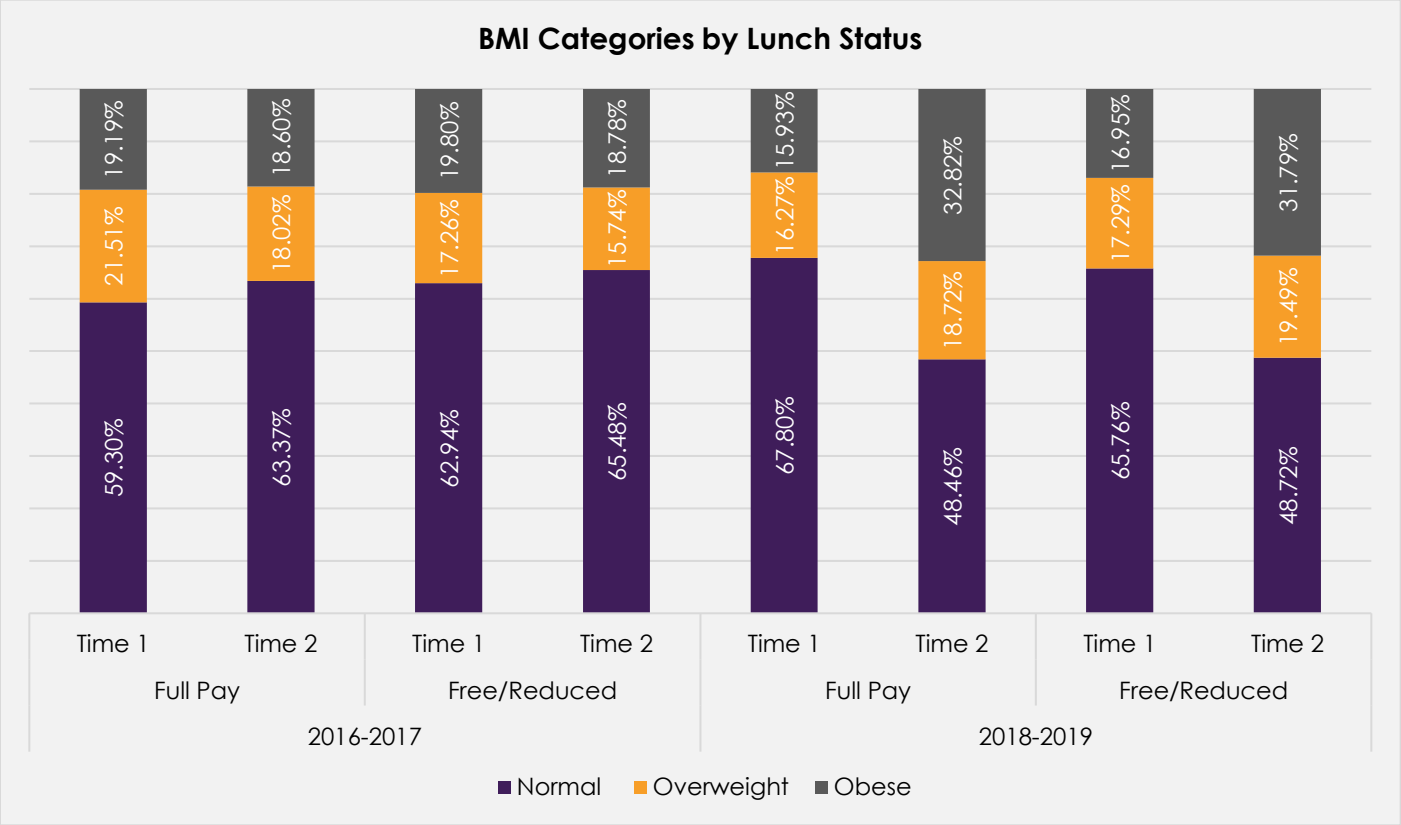
MIDDLE SCHOOL YEAR 3 KEY DATA OBSERVATIONS

- There were more youth who pay full price for lunch in the normal weight category youth compared to youth who receive free or reduced lunch at both time 1 and time 2. (Table 8 and Chart 8)
- There were not significant shifts in the distribution of weight categories among youth who pay full price for lunch or students who receive reduced price lunch from the beginning to the end of the semester. (Table 8 and Chart 8)

Table 8: BMI Weight Categories Among Youth in Grades 6-8 by Lunch Status at RP Dawkins

	2016-2017		2018-2019	
	Time 1	**Time 2**	**Time 1**	**Time 2**
Full Pay			*% (n)*	*% (n)*
Normal	59.30% (102)	63.37% (109)	67.80% (200)	65.76% (194)
Overweight	21.51% (37)	18.02% (31)	16.27% (48)	17.29% (51)
Obese	19.19% (33)	18.60% (32)	15.93% (47)	16.95% (50)
Free/Reduced				
Normal	62.94% (124)	65.48% (129)	48.46% (189)	48.72% (190)
Overweight	17.26% (34)	15.74% (31)	18.72% (73)	19.49% (76)
Obese	19.80% (39)	18.78% (37)	32.82% (128)	31.79% (124)

Chart 8. BMI Categories by School Lunch Status among Youth Grades 6-8 2018-2019 at RP Dawkins



BMI Percentiles

It is important to note that the samples from year one and year three are not identical, with some youth in the sample only included in year one, some youth only included in year three, and some youth included in both years. Therefore, interpretations of change in BMI percentiles from year one to year three should be made very conservatively.

ELEMENTARY YEAR 1 KEY DATA OBSERVATIONS

- There was a statistically significant difference in BMI percentiles by race ethnicity in the spring, with Hispanic youth having a higher average BMI percentile (M=72.48) compared to all other race/ethnicity categories. (Table 9)
- There was a statistically significant difference in BMI percentile by lunch status, with students who received free or reduced lunch having a higher mean BMI percentile (M=65.05) than those who were full pay (M=60.01). (Table 9)
- There were no statistically significant difference in change in BMI percentile from fall to spring semester by any of the demographic characteristics. (Table 10)

ELEMENTARY YEAR 3 KEY DATA OBSERVATIONS

- There were statistically significant differences in mean BMI in spring between youth in all race/ethnicities. Youth in the "Other" race/ethnicity category had the lowest mean BMI percentile (M=59.75), while Hispanic youth had the highest mean BMI percentile (M=76.68). (Table 9)
- There were no statistically significant difference in change in BMI percentile from fall to spring semester by any of the demographic characteristics. (Table 10)

Table 9: Analysis of Variance of BMI Percentiles among Elementary School Youth in Spring

	Spring 2017		Spring 2019	
	Mean	**SD**	**Mean**	**SD**
Gender	*n = 1771*		*n = 1676*	
Male	64.13	31.80	63.52	31.57
Female	62.62	31.00	64.42	31.45
Race/Ethnicity	*n = 1759*		*n = 1676*	
White	60.13*	32.03	60.48*	31.83
Black	62.85*	30.79	67.22*	30.13
Hispanic	72.48*	27.58	76.68*	27.28
Other	58.83*	33.48	59.75*	33.09
Lunch Status	*n = 1760*		*n = 1676*	
Full Pay	60.01*	32.33	63.67	30.70
Free/Reduced	65.05*	30.70	64.12	32.01
	**Significant differences between Hispanic & all other race/ethnicities and by lunch status (p<.05)*		**Significant differences by race/ethnicity (p<.05)*	
Tests: Analysis of Variance with Tukey post hoc comparisons				

Table 10: Analysis of Variance of Change in BMI Percentile among Elementary Youth from Fall to Spring

	Fall 2016 - Spring 2017		Fall 2018 - Spring 2019	
	Change	**SD**	**Change**	**SD**
Gender	*n = 1771*		*n = 1676*	
Male	-1.74	28.12	2.04	28.06
Female	-0.21	26.17	-0.7	29.15
Race/Ethnicity	*n = 1759*		*n = 1676*	
White	-0.41	30.75	0.73	32.1
Black	-2.98	23.43	1.34	23.2
Hispanic	0.12	19.61	-1.02	18.53
Other	-2.16	31.03	1.28	25.28
Lunch Status	*n = 1760*		*n = 1676*	
Full Pay	-0.62	30.78	1.99	30.19
Free or Reduce	-1.12	25.27	-0.23	27.65
Tests: Analysis of Variance with Tukey post hoc comparisons				

MIDDLE SCHOOL YEAR 1 KEY DATA OBSERVATIONS

- In the 2018-2019 school year, there was a statistically significant difference by race/ethnicity in the average BMI percentile between White and Hispanic youth (p=0.045), with Hispanic youth having a higher mean BMI percentile (M=75.70) at the end of the fall and spring semesters compared to white youth (M=61.65). (Table 11)
- There were no differences in BMI percentile change from beginning to end of the semester among middle school youth by any demographic characteristic. (Table 12)

MIDDLE SCHOOL YEAR 3 KEY DATA OBSERVATIONS

- There were statistically significant differences in BMI percentiles by race/ethnicity at the end of each semester: Black (M=74.85%) and Hispanic (M=76.10) youth had significantly higher BMI percentiles compared to White (M=62.69%) youth (F=9.72, p<.001). (Table 11)
- There was a statistically significant difference between BMI percentiles by lunch status, with students receiving free/reduced lunch (M=72.61%) having higher BMI percentiles compared to students who paid full price for lunch (M=65.23%) at the end of both semesters (F=11.13, p<.001). (Table 11)
- In the 2018-2019 school year, there were no differences in BMI percentile change from time 1 to time 2 (from beginning to the end of the semester in fall and spring) by any demographic characteristic. (Table 12)

Table 11: Analysis of Variance of BMI Percentiles among Elementary School Youth in Spring

	2016-2017 Time 2		2018-2019 Time 2	
	Mean	**SD**	**Mean**	**SD**
Gender	*N=369*		*n=683*	
Male	64.97	29.7638162	67.79	29.46
Female	62.75	31.0619213	71.27	28.18
Race/Ethnicity	*N=369*		*n=685*	
White	61.65*	7.27	62.69*	30.69
Black	63.72	11.50	74.85*	26.47
Hispanic	75.70*	6.83	76.10*	27.69
Other	62.88	9.08	67.72	26.90
Lunch Status	*N=369*		*n=685*	
Full Pay	63.40	31.51	65.23*	28.43
Free/Reduced	64.46	29.35	72.61*	28.87
	**Significant differences by race/ethnicity (White compared to Hispanic youth only) (p<.05)*		**Significant differences by race/ethnicity (White compared to black and Hispanic) and lunch status (p<.05)*	
Tests: Analysis of Variance with Tukey post hoc comparisons				

Table 12: Analysis of Variance of Change in BMI Percentiles among Middle School Youth from Fall to Spring

	2016-20167 (n=)		2018-2019 (n=685)	
	Change	**SD**	**Change**	**SD**
Gender	*N=369*		*n=683*	
Male	-0.69129886	9.44886307	0.22	9.30
Female	-1.56067382	8.65605757	0.24	11.22
Race/Ethnicity	*N=369*		*n=685*	
White	-0.72278205	7.2664870	0.66	11.02
Black	-1.96313439	11.4943801	0.04	9.16
Hispanic	0.73679385	6.8272087	0.41	13.50
Other	-1.63671881	9.0844699	-0.81	7.56
Lunch Status	*N=369*		*n=685*	
Full Pay	-1.0819591	7.1141079	0.83	10.41
Free or Reduced	-1.0871976	10.5458460	-0.23	10.10
Tests: Analysis of Variance with Tukey post hoc comparisons				

PACER Laps

It is important to note that the samples from year one and year three are not identical, with some youth in the sample only included in year one, some youth only included in year three, and some youth included in both years. Therefore, interpretations of changes in BMI from year one to year three should be made conservatively.

ELEMENTARY YEAR 1 KEY DATA OBSERVATIONS

- There was a statistically significant difference in the mean PACER laps during the spring 2018 by race ethnicity, with Hispanic youth (M=21.34) completing more PACER laps compared to all other race/ethnicity groups. There were no statistically significant difference in the number of PACER laps completed by gender or race/ethnicity. (Table 13)
- The change in mean PACER laps from fall to spring semester was significantly greater for female youth (M=1.81) than for male youth (M=0.85), as well as for those who received free or reduced lunch (M=1.80) compared to those who were full pay (M=0.54). (Table 14)

ELEMENTARY YEAR 3 KEY DATA OBSERVATIONS

- Male youth completed significantly higher mean PACER laps (M=18.77) compared to female youth (M=15.69) during spring 2019. Additionally, there was a significant difference in mean PACER laps between White youth (M=18.05) and Black youth (M=15.18). Students who receive free or reduced lunch had a significantly lower mean (M=16.66) compared to students who were full pay (M=18.26). (Table 13)
- Hispanic youth had a significantly higher change in mean PACER laps from fall to spring semester (M=4.80) compared to White youth (M=2.77) and Black youth (M=3.35). Additionally, those who received free or reduced lunch had a significantly higher change in mean PACER laps between fall and spring (M=3.84) than those who were full pay (M=2.41) (Table 14)

Table 13: Analysis of Variance of PACER Laps Completed among Elementary School Youth

	2016-2017 Time 2		2018-2019 Time 2	
	Mean	**SD**	**Mean**	**SD**
Gender	*n = 1200*		*n = 1119*	
Male	18.27	11.26	18.77*	10.37
Female	17.32	9.24	15.69*	7.47
Race/Ethnicity	*n = 1196*		*n = 1119*	
White	17.20*	9.32	18.05*	9.46
Black	15.65*	10.10	15.18*	8.23
Hispanic	21.34*	11.39	17.39	9.33
Other	17.56*	11.40	16.61	8.24
Lunch Status	*n = 1197*		*n = 1119*	
Full Pay	18.00	10.21	18.26*	9.78
Free/Reduced	17.67	10.34	16.66*	8.77
	**Significant differences between Hispanic and all other race/ethnicities (p<.05)*		**Significant differences by gender, between White and Black, and by lunch status (p<.05)*	
Tests: Analysis of Variance with Tukey post hoc comparisons				

Table 14: Analysis of Variance of Change in PACER Laps completed among Elementary School Youth				
	Fall 16 - Spring 17		Fall 18 - Spring 19	
	Change	SD	Change	SD
Gender	*n = 1267*		*n = 1119*	
Male	0.85*	8.90	3.12	5.49
Female	1.81*	8.28	3.52	6.29
Race/Ethnicity	*n = 1263*		*n = 1119*	
White	1.27	9.21	2.77*	5.95
Black	1.29	7.47	3.35*	5.87
Hispanic	1.37	8.03	4.80*	5.93
Other	1.75	8.53	3.64	4.96
Lunch Status	*n = 1264*		*n = 1119*	
Full Pay	0.54*	9.33	2.41*	5.48
Free/Reduced	1.80*	8.16	3.84*	6.08
	**Significant differences by gender and lunch status (p<.05)*		**Significant differences between White & Hispanic, Black & Hispanic, and by lunch status (p<.05)*	
Tests: Analysis of Variance with Tukey post hoc comparisons				

MIDDLE SCHOOL YEAR 1 KEY DATA OBSERVATIONS

- In 2016-2017, there were no statistically significant differences in the number of PACER laps completed at the end of the semester in the fall or spring by any demographic characteristic among middle school youth. (Table 15)
- There were also no statistically significant differences in the change in the number of PACER laps completed from the beginning to the end of the semester by any demographic characteristic among middle school youth. However, all youth except youth in the "Other" race category completed more PACER laps from beginning to the end of the fall and spring semesters. (Table 16)

MIDDLE SCHOOL YEAR 3 KEY DATA OBSERVATIONS

- There were statistically significant differences in the number of PACER laps completed at time two in fall and spring by gender (F=72.47, p<.0001), race/ethnicity (F=7.45, p<.0001), lunch status (F=16.63 p<.001): male youth completed more (M=31.04) PACER laps than female youth (M=21.03), White youth (M=29.46) completed more PACER laps compared to Black (M=24.15) and Hispanic (M=21.16) youth, and youth who paid full price (M=29.10) for lunch completing more PACER laps than youth who received free/reduced price lunch (M=24.07). (Table 15)
- In the 2018-2019 school year, there were no statistically significant differences in the change in number of PACER laps completed at the beginning to the end of the semester. Although, all youth by every demographic characteristic, except Hispanic youth, completed more PACER laps at the end of the semester in both fall and spring. (Table 16)

Table 15: Analysis of Variance of PACER Laps Completed among Middle School Youth				
	2016-2017 Time 2		2018-2019 Time 2	
	Mean	SD	Mean	SD
Gender			*n=660*	
Male	30.53	17.99	31.04*	17.48
Female	28.45	15.99	21.03*	11.97
Race/Ethnicity			*n=660*	
White	28.84	16.32	29.46*	16.30
Black	31.94	19.31	24.15*	16.45
Hispanic	25.49	12.69	21.16*	11.16
Other	29.08	15.77	26.31	13.67
Lunch Status			*N=660*	
Full Pay	28.28	16.14	29.10*	17.02
Free/Reduced	30.81	17.96	24.07*	14.62
			**Significant differences by gender, lunch status, and race/ethnicity (White vs. Black and Hispanic) (p<.05)*	
Tests: Analysis of Variance with Tukey post hoc comparisons				

Table 16 : Analysis of Variance of Change in PACER Completed Laps among Middle School Youth				
	2016-2017 Time 2		2018-2019 Time 2	
	Change	SD	Change	SD
Gender			*n=661*	
Male	2.64	6.87	2.61	8.26
Female	2.56	7.28	1.76	6.47
Race/Ethnicity			*n=661*	
White	2.90	6.70	2.05	7.36
Black	2.67	7.16	2.44	7.57
Hispanic	3.30	5.80	0.35	8.01
Other	-0.35	9.44	3.44	6.82
Lunch Status			*n=661*	
Full Pay	2.70	7.53	2.45	7.24
Free/Reduced	2.53	6.60	2.02	7.64
Tests: Analysis of Variance with Tukey post hoc comparisons				

Overall, these findings indicate that youth weight status remained relatively stable from fall to spring among both elementary and middle school students. Specifically, among elementary school age there was some variability by demographic characteristic with some categories increasing slightly, however, none of these differences were statistically significant. Amon middle school students there were slight decreases across all demographic categories from beginning to end of the fall and spring semesters, however none of these differences were significant. While weight status remained relatively stable during year three at each time points, the number of youth who are obese is higher than the national average of 18.4%. These findings for BMI changes are similar to other studies that have found that, on average, youth weight status remains relatively stable during the school year, with BMI increases largely occurring during the summer months. Also disparities related to lunch status (proxy for income), gender, and race/ethnicity in the SHSI sample in years one and three were similar to national trends. Overall fitness levels increased from fall to spring in both year one and three among elementary and middle school youth, with limited exceptions; however, on average, fitness levels remain lower than the threshold for the healthy fitness zone.

Conclusion and Next Steps

Impact of COVID-19 on Implementation and Evaluation

The COVID-19 pandemic had an impact on both the implementation and evaluation of the SHSI. The pandemic shut South Carolina schools down in mid-March 2020, the final year of the Healthy Schools Initiative. The participating schools stopped working on the HSP temporarily in March and began to revisit their action plans in late summer/early fall once there was a better understanding of how schools would operate with COVID-19 protocols. Schools were given additional time to use their funds and the TA team regularly shared HG resources to address emerging student, staff, and family wellness needs resulting from the pandemic. The TA team was able to hold three of the four scheduled school wellness coordinators meetings in the final year, but had to cancel the final meeting. This cancellation prevented a formal conclusion of the initiative with all of the wellness coordinators. However, MBF and the TA team met with all of the principals via Zoom to conclude the initiative. Technical assistance is ongoing indefinitely. Even during this highly stressful spring semester, all seven of the schools that qualified to apply for the National Healthy Schools Award completed their applications, received the award, and were named to the list of America's Healthiest Schools.

As a result of COVID-19's impact on schools, the evaluation team was unable to obtain all Fitnessgram BMI and PACER data as well as Student Nutrition and Behavior Survey data. Abbreviated Physical Activity and Environment Audit data were obtained by the implementation team in Year Four.

Next Steps and Recommendations

Policy, systems, and environment (PSE) change interventions are challenging to evaluate because they are complex in nature and require input from multi-sectoral stakeholders, such as funders, community-based organizations, and researchers, which bring varying levels of evaluation expertise and capacity as well as different primary objectives to the project. Further, PSE interventions rely on the impact of multiple factors over time, thus making evaluation findings difficult to interpret and link to causal factors. For example, one "simple" change in written policy for food used as reward requires initial buy-in at the administration level, followed by communication with classroom teachers, and ultimately buy-in and practice change at the classroom level.

Therefore, PSE change interventions often take a number of years to fully implement and see long term change. Despite these challenges in implementation and evaluation of PSE change interventions, they are still considered best practice when trying to create long-term, sustainable, and upstream changes to health behaviors including healthy eating and active living. Another challenge experienced by the SHSI evaluation team was the capacity of school districts to engage in robust data collection and management. School districts, based on size, have varying levels of administrative staff support to engage in activities such as data sharing agreement development, monitoring adherence to data collection protocols, and ensuring data quality.

Based on the aforementioned challenges of PSE evaluation and school district capacity, future implementation evaluation efforts of the SHSI program evaluation should consider the following:

1. *Identify school districts with the highest ability to collect robust evaluation data and recruit more schools to increase study sample size. Once the SHSI has been demonstrated to be evidenced-based, implementation could expand to other school districts with process evaluation only.*
2. *Future evaluation of the SHSI would benefit from more and better matched control schools. Three control schools were selected by three participating districts, but these schools differed on baseline characteristics and provided limited data. Control data would allow for more robust causal linkages between SHSI implementation and outcome measures of interest.*
3. *Increased evaluation capacity building among school districts with limited data collection and management capacity.*