Project SWEAT: A Nutrition and Physical Activity Assessment of USDA Summer Food Service Program Sites in Urban, Low-Income Zip Codes

Leah May
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Abstract

Background: Childhood overweight and obesity persists, and the summer months are a window of risk for unhealthy child weight gain. Unfortunately, little is known about the food and physical activity [PA] environments to which kids are exposed during the summer.

Objective: To examine the food and PA environments away from the home – specifically, USDA Summer Food Service Program [SFSP] sites – to which children are exposed during the summer months.

Methods: Two Columbus City Schools in low-income, urban zip codes were recruited - 43205, 43206, 43207. The SFSP sites in the surrounding neighborhoods of the schools were identified. Sites were assessed using the Project SWEAT Site Environmental Assessment form.

Results: 20 SFSP sites were identified. 70% (n=14) of sites were open SFSP sites. 90% (n=18) of sites had accessible water fountains. 25% (n=5) and 40% (n=8) of sites had snack and beverage vending machines with 100% (n=5) of snack vending machines having mixed healthy and unhealthy options. 88% (n=7) of sites had beverage vending machines having mixed healthy and unhealthy options and 12% (n=1) having only unhealthy options. Indoor and outdoor PA environments were present at 75% (n=15) and 85% (n=17) of sites; 35% (n=7), 5% (n=1), 60% (n=12), and 85% (n=17) had swimming pool, trampoline, playground equipment, and a basketball hoop. Outdoor fields were present at 80% (16) of sites, and indoor basketball hoops and outdoor playgrounds were each available at 60% (12) of sites. Indoor gyms were available at 75% (15) of sites. Seventy percent (n=14) of sites had screen time devices present,

specifically children had access to televisions, computers, and video game consoles at 55% (n=11), 50% (n=10), and 15% (n=3) of sites respectively.

Conclusions: Overall, the food and PA environments of the sites were favorable due to the availability of PA environments at most sites and the health of available snack and beverage sources. Information from this study can be used to reform policy to ensure child accessibility to positive environments during the summer months.

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Introduction

Two grave issues of nutritional health exist for children in the United States today- obesity and food insecurity. Obesity is prevalent in the United States, and childhood obesity is being regarded as an epidemic.[1,2] Statistics show that in the past few decades, the rate of pediatric obesity has rapidly increased.[1,2] In 2015-2016, the prevalence of obesity was 18.5% in youth.[2] Since 1980, the obesity rate in children two to five years old has increased from 5.0% to 12.4%.[2] Although previous reports showed that rates childhood obesity has plateaued recently,[2] the newest study using NHANES data from 1999-2016 shows that there has been no decline in obesity and, in contrast, in the 2-5-year-old age group, there has been a significant increase in rates of severe obesity and other subgroups have followed this same trend.[1] According to the most recent NHANES data, higher rates of obesity are evident in African American and Hispanic youth more than their non-Hispanic White and Asian American peers.[1,2]

The second issue of nutritional health affecting children in the United States today is food insecurity. Household food insecurity is defined by limited or inconsistent access to an adequate amount of safe food.[3] Food insecurity, according to the United States Department of Agriculture [USDA], affects about 12.3% of households in the United States.[3] Certain demographic factors lead to greater vulnerability, including households with children (16.5%), children headed by a single woman (31.6%), lower incomes (31.6%) below 185% of the poverty line, and non-Hispanic black households (22.5%).[3]

Feeding programs were developed informally in the 1700's to address the issue of food insecurity in the United States. The Great Depression prompted a movement for formal

programs. In 1946, the National School Lunch Program was established when the National School Lunch Act [NSLA] was signed.[4] The NSLA was amended in 1968 to create the Summer Food Service Program [SFSP] to accommodate the need for children to have access to adequate healthy food options during the summer months as well.[5] Although SFSP has been available for decades, this program is underutilized by eligible families; less than 15% of children participating in NSLP during the school year participate in SFSP, putting children at risk for food insecurity during the summer months.[6]

Not only are children at risk for food insecurity during the summer months, but an emerging trend points to the summer as a window of risk for weight gain when school is out of session, especially for minority children.[7,8] Although few studies have explored possible external factors that affect health behaviors and weight during this timeframe, the protective effect schools through the provision of meals and structured programs has been suggested.[9] Little effort has been made to assist disadvantaged children by providing them with resources during the summer and if efforts are not made to correct this problem, it is expected to worsen the health disparities that already exist in minority populations and intensify the prevalence of childhood obesity.[2]

Although the prevalence of childhood obesity is evident, the causes of this trend during the summer months is much less known and has not been studied in depth. The summertime is one particular window of risk for childhood obesity. Recently, studies have been conducted to investigate these trends. Results have shown that a protective factor for weight gain is provided when a child participates in summertime programming, whether that program teaches nutrition and physical education concepts or not.[10] Little is known about the causes of

unhealthy weight gain in children during the summer months- health behaviors, environments, etc.

USDA SFSP feeding sites are a primary non-home environment to which low-income, school-aged children are exposed during the summer months. Although there are some studies that focus on the potential effect of the SFSP on food insecurity[11], to our knowledge, no studies exist that have examined the environments of USDA SFSP sites. The objective of this study was to examine key nutrition and physical activity environmental factors away from that home at USDA SFSP feeding sites that may affect children during the summer months. The specific aims of this study were to:

1. To determine the physical activity environments to which children who participate in structured programming during the summer months are exposed.

    Hypothesis 1.1: Structured programming sites will provide positive physical activity (opportunities, equipment, safe play, etc.) environments to children during the summer months.

2. To determine the food environments to which children who participate in structured programming during the summer months are exposed.

    Hypothesis 2.1: Structured programming sites will provide positive dietary (healthy food) environments to children during the summer months.

Methods

Recruitment

Summer structured programming sites were identified and recruited through collaborations with two Columbus City Schools, the Columbus Recreation and Parks Department [CRPD], and local government stakeholders. Using the neighborhoods of the two elementary schools as the target geographic location, all (n=28) SFSP feeding sites in zip codes 43205, 43206, and 43207 were identified. A database of all sites with geographic location and contact information for these stakeholders was created and maintained. Each site was contacted via phone or in-person visit to schedule the data collection visit.

Data Collection Training

Data collectors included undergraduate and graduate students from nutrition-related fields. All data collectors completed an 8-hour data collection training for Project SWEAT. An additional hour of training was completed for environmental assessment site data collectors (see Appendix A: Training Powerpoin). This training included site visit protocol, data collection and storage protocol, and proper completion of the Site Environmental Assessment form (Appendix C).

Data Collection

The Project SWEAT Site Environmental Assessment form (Appendix C) was modified from the B'More Healthy Communities for Kids study. This multi-level research intervention focused on food and social environments of low-income African American youth to prevent childhood obesity.[12] The Site Environmental Assessment form was modified for use in Camp NERF, a multi-component program for underserved children to prevent unhealthy weight gain

during the summer months.[10] After using this form for Camp NERF, it was revised for use in the Project SWEAT study. The SWEAT Environmental Assessment has been reviewed by nutritionists and dietitians (n=5) for content validity and modified accordingly.

Data collection folders were created for each site, containing a cover checklist, a Letter of Support from CRPD, a Consent Form, and the Data Collection Form. Site data collectors retrieved a folder to bring with them for the scheduled site visit. At the site, the consent form (Appendix B) was signed by the site main contact prior to data collection.

A Project SWEAT Site Environmental Assessment form (Appendix C) was completed once at each identified site between June 2017 and August 2017 to assess the food and physical activity environments to which children who attend programming are exposed.

Trained site data collectors from the Project SWEAT research team were assigned to each of the 28 identified structured programming locations. The site data collector called the site main contact to schedule a time to complete the environmental assessment that would be mutually convenient during programming hours. If the main contact was unable to be reached or no contact information was available, a small team stopped by the site in person to talk to the site main contact to schedule an appointment or complete the environmental assessment during the visit.

Upon arrival, the team of two to four researchers connected with the front desk or main contact to confirm data collection for that day and obtain general site information as well as use flyers or other media to assist in collection of this information. Then, the site was observed on foot as data on demographic information, physical environment, and food source environment of the site were collected. Data collectors were asked to take note of or gather

copies of menus and other health-related media. After site observation, data collectors met with the site main contact to complete the Site Environmental Assessment form (Appendix C), including site activities, site physical activity environment, and a food log for meals served that day. All data was collected with the staff at participating summer structured programming sites.

Data Analysis

After completion of data collection, the folder and all accompanying information was delivered to a specific file folder in a secure, locked office. The Site Environmental Assessment form database was created using Microsoft Access, and this database was used to input data from the form completed at each site. For the Site Environmental Assessment form, summary proportion statistics were run.

Results

Site Characteristics

Seventy percent (n=14) of sites were open USDA SFSP feeding sites. Sites opened as early as 7:00 PM and stayed open as late as 8:00 PM with most opening between 8:00 -9:00 AM and closing at various times, with the most common closing time (n=4) of 3:00 PM ET. Only one site was open every day, including Saturdays and Sundays, and one site was open only 3 days per week. Ninety percent (n=18) of sites were open Monday through Friday. One hundred percent (n=20) of sites had majority African American ethnicity. See full list of site characteristics in

Table ***1***.

Table 1: Site Characteristics

Characteristic	Statistic
SFSP Site, %(n)	100.00 (20)
Open Site, %(n)	70.00 (14)
Number of Staff, Mean ± SE	8.75 ± 1.29
Children from Neighborhood, %(n)	85.00 (17)
Majority Ethnicity, %(n)	
African American	100.00 (20)
Asian	0.00 (0)
White	5.00 (1)
Hispanic	0.00 (0)
Other	0.00 (0)
Open Days Each Week, %(n)	
Seven Days	5.00 (1)
Five Days	90.00 (18)
Three Days	5.00 (1)

Physical Environment

Outdoor fields were present at 80% (16) of sites, and indoor basketball hoops and outdoor playgrounds were each available at 60% (12) of sites. Indoor gyms were available at 75% (15) of sites. Seventy percent (n=14) of sites had screen time devices present, specifically children had access to televisions, computers, and video game consoles at 55% (n=11), 50% (n=10), and 15% (n=3) of sites respectively. See full list of physical environment data in Table 2.

Table 2: Physical Environment

Characteristic	Statistic
Number of Rooms, Mean ± SE	5.40 ± 0.71
Number of Activities, Mean ± SE	3.56 ± 0.49
Indoor Gym, %(n)	75.00 (15)
Outdoor Gym, %(n)	40.00 (8)
Indoor Basketball, %(n)	70.00 (14)
Outdoor Basketball, %(n)	60.00 (12)
Outdoor Playground, %(n)	60.00 (12)
Outdoor Field, %(n)	80.00 (16)
Outdoor Track, %(n)	15.00 (3)
Nearby Parks[a], %(n)	95.00 (19)
TV, %(n)	55.00 (11)
Number of TVs, Mean ± SE	2.00 ± 0.54
Computer, %(n)	50.00 (10)

Number of Computers, Mean ± SE	16.60 ± 4.81
Video Game Consoles, %(n)	15.00 (3)
Number of Consoles, Mean ± SE	1.00 ± 0.00
Number of Food- or Nutrition-Related Signs, Mean ± SE	2.00 ± 0.65
[a] Parks within a 1 mile radius of site; PA= Physical Activity	

Food Source Environment

Ninety percent (n=18) of sites had accessible water fountains. Twenty-five percent (n=5) and 40% (n=8) of sites had snack and beverage vending machines respectively. One hundred percent (n=5) of snack vending machines had mixed healthy and unhealthy options. One hundred percent (n=8) of sites had beverage vending machines having mixed healthy and unhealthy options. See full list of food environment data in Table 3.

Table 3: Food Environment

Source	% (n)	Mean ± SE	Healthfulness	
Water Fountain Access	90.00 (18)	2.56 ± 0.33	Unhealthy Mixed Healthy	0.00 (0) 0.00 (0) 100.00 (17)
Snack Vending	25.00 (5)	1.60 ± 0.40	Unhealthy Mixed Healthy	0.00 (0) 100.00 (5) 0.00 (0)
Beverage Vending	40.00 (8)	1.88 ± 0.13	Unhealthy Mixed	0.00 (0) 100.00 (8)

			Healthy	0.00 (0)
Concession	0.00 (0)	-	-	-
Other Food	5.00 (1)	1.00 ± 0.00	Unhealthy Mixed Healthy	0.00 (0) 100.00 (1) 0.00 (0)

Site Activities

Arts and crafts were available at 95% (n=19) sites and were performed for an average of 60.56 ± 7.50 minutes, 3.22 ± 0.42 days per week. Physical activities were performed at 90% (n=18) of sites for an average of 144.72 ± 29.83 minutes, 4.78 ± 0.24 days per week. Reading activities were also frequently performed at 85% (n=17) of sites, on average 4.47 ± 0.35 days per week for 57.19 ± 9.39 minutes each day. See full list of site activities in Table 4.

Table 4: Weekly Activities

Activity	% (n)	Days/Week Mean ± SE[a]	Minutes/Day Mean ± SE[b]
Arts and Crafts	95.00 (19)	3.22 ± 0.42	60.56 ± 7.50
Reading	85.00 (17)	4.47 ± 0.35	57.19 ± 9.39
PA	90.00 (18)	4.78 ± 0.24	144.72 ± 29.83
TV	55.00 (11)	2.30 ± 0.70	55.60 ± 12.02
Computer	50.00 (10)	3.67 ± 0.58	38.13 ± 7.32
Video Game	20.00 (4)	1.50 ± 0.87	80.00 ± 20.00
Other Programs	75.00 (15)	1.50 ± 0.33	135.83 ± 30.09

Physical Activity Environment

Rules, restrictions, and barriers to PA were assessed, and TV was restricted “often” on average. Time outside was restricted “rarely” on average, and children were supervised outside and while using the internet “very often”. See full list of rules and restrictions data in Table 5. Statements including insufficient staff to supervise children and lack of resources to purchase fitness equipment, were rated “strongly disagree” and “disagree” by site leaders on average, respectively. See full list of barriers to PA data in Table 6. On average, children were encouraged to go outside and were offered support for PA by the site leader and other staff 5-6x per week. See full list of reinforcement and support data in Table 7. Directors and staff participated in sedentary and moderate PA more frequently than vigorous PA. The same trend was seen for children. See full list of modeling behavior data in

. Indoor and outdoor PA environments were present at 75% (n=15) and 85% (n=17) of sites, respectively. Specifically, 35% (n=7), 5% (n=1), 60% (n=12), and 85% (n=17) had swimming pool, trampoline, playground equipment, and a basketball hoop, respectively. See full list of physical activity environment data in Table 9.

Table 5: Rules and Restrictions

Rules and Restrictions	Mean ± SE[a]
Frequency of TV restriction	3.00 ± 0.35

Table *9*: Physical Activity Environment

Environmental Availability	% (n)
Pool	35.00 (7)
Trampoline	5.00 (1)
Playground Equipment	60.00 (12)
Basketball Hoop	85.00 (17)
TV **Basic Channels** **Cable**	 0.20 ± 0.12 0.40 ± 0.22
DVDs/movies/Netflix/etc	1.10 ± 0.27
Game System	0.30 ± 0.21
Computer	1.70 ± 0.43
Internet	1.80 ± 0.41
Balls	3.45 ± 0.29
Bats	1.80 ± 0.40
Bikes	0.20 ± 0.20
Gym Equipment, i.e. weights	0.35 ± 0.24
Jump Rope	2.95 ± 0.34
Scooters	0.35 ± 0.22
Other toys	3.25 ± 0.35

[a] 0=never; 1=<1x per week; 2=1-2x per week; 3=3-4x per week; 4=5-6x per week; 5=daily

Frequency of restricting time outside	1.21 ± 0.27
Outside Supervision	3.89 ± 0.13
TV Supervision	3.33 ± 0.35
Internet Supervision	3.62 ± 0.33
Don't allow outside play when dark	2.00 ± 2.00
TV not on during mealtime	3.45 ± 0.41
TV not allowed until homework finished	3.36 ± 0.39
[a] 0=never; 1=rarely; 2=sometimes; 3=often; 4=very often	

Table 6: Barriers to PA

Statement	Mean ± SE[a]
No adults present during daylight hours to supervise children in active play outside	0.37 ± 0.23
Sport and home fitness equipment items too expensive to buy for children	1.22 ± 0.30
[a] 0=strongly disagree; 1=disagree; 2=neither disagree nor agree; 3=agree; 4=strongly agree	

Table 7: Reinforcement and Support

Statement	Mean ± SE[a]
Encouragement to go outside	3.75 ± 0.14
Praise for PA	
Director	3.75 ± 0.22
Staff	3.60 ± 0.22
Participating in PA with children	
Director	2.80 ± 0.32
Staff	3.68 ± 0.20
Support PA	
Director	3.60 ± 0.28

Staff	3.60 ± 0.28
[a] 0=never; 1=<1x per week; 2=1-2x per week; 3=3-4x per week; 4=5-6x per week; 5=daily	

Table 8: Modeling Behaviors

Modeling	Mean ± SE [a]
Director PA	
Vigorous	2.20 ± 0.43
Moderate	4.00 ± 0.31
Sedentary	4.35 ± 0.31
Staff PA	
Vigorous	2.80 ± 0.41
Moderate	4.15 ± 0.25
Sedentary	4.20 ± 0.34
Child PA	
Vigorous	3.70 ± 0.40
Moderate	4.40 ± 0.35
Sedentary	4.30 ± 0.34
[a] 0=never; 1=1x per week; 2=2x per week; 3=3x per week; 4=4x per week; 5=daily/5x per week	

Table 9: Physical Activity Environment

Environmental Availability	% (n)
Pool	35.00 (7)
Trampoline	5.00 (1)
Playground Equipment	60.00 (12)
Basketball Hoop	85.00 (17)
TV **Basic Channels** **Cable**	 0.20 ± 0.12 0.40 ± 0.22
DVDs/movies/Netflix/etc	1.10 ± 0.27
Game System	0.30 ± 0.21
Computer	1.70 ± 0.43
Internet	1.80 ± 0.41
Balls	3.45 ± 0.29
Bats	1.80 ± 0.40
Bikes	0.20 ± 0.20
Gym Equipment, i.e. weights	0.35 ± 0.24
Jump Rope	2.95 ± 0.34
Scooters	0.35 ± 0.22
Other toys	3.25 ± 0.35

[a] 0=never; 1=<1x per week; 2=1-2x per week; 3=3-4x per week; 4=5-6x per week; 5=daily

Discussion

The present study addresses aspects concerning the childhood obesity epidemic, unhealthy summer weight gain, and the significance of future studies in this area of groundbreaking research. To our knowledge, no studies exist that have examined the environments of USDA SFSP sites.

Overall, the food and PA environments of the sites in the present study were favorable due to two factors. The first factor is the availability of PA environments at most sites. The PA environment included availability of space for safe play, equipment, support for PA, and any present barriers to PA. Indoor gyms were available at 75% (15) of sites and indoor basketball hoops were available at 60% (12) of sites. Outdoor playgrounds were available at 60% (12) of sites. Time spent outside was restricted, on average, 1.21 ± 0.27 which corresponds with "rarely", and on average site leaders answered 0.37 ± 0.23 or "strongly disagree" in response to the statement "there are no adults present here during daylight hours to supervise the children in active play outside." Trends in types of physical activity performed were similar between the children and staff. Participation in sedentary and moderate PA was reportedly more frequent than vigorous PA. These estimates were self-reported by the site director and were not assessed in any other manner such as a physical activity survey administered to the children or directly observed at the sites, so this subjective report may not be reliable. However, it is noteworthy that the trends in the current study show that the children's PA levels may be associated with the level of PA modeled by site staff members.

PA was well-supported by directors and staff. On average, encouragement to go outside, praise and support for PA, and participation of staff in PA with the children was 3.6 ± 0.28 and higher, indicating these outcomes occurred at least 3 times per week. The directors' participation in PA with the children was less frequent, with an average of 2.80 ± 0.32 indicating participation between 1-2x and 3-4x per week. During data collection and discussing the questions on the Site Environmental Assessment form with the directors, some directors expressed interest in being more involved directly with the children but stated that they were unable to participate in PA with them due to other time-consuming administrative duties. Reinforcement and support of these activities encourages active play, which improves the PA environments of SFSP sites.

The second factor in the favorable food and PA environments is the healthfulness of available snack and beverage sources. The food environment at each site included the SFSP meals served, as well as access to water fountains and vending machines. At sites with snack vending machines, the healthfulness of 100% (n=5) of the snack vending was mixed, meaning there were both healthy and unhealthy options to choose from. At sites with beverage vending machines, the healthfulness of 100% (n=8) of the beverage vending was mixed. Although these vending machines were assessed by trained data collectors, there may be some bias to these assessments. In the future, a validated tool will be used to assess healthfulness of vending machines. However, these data are still promising in that many sites did not have other food or beverage sources available outside the SFSP and water fountains. Many children who attend these sites, therefore, are being exposed to positive food environments during the summer

months which may be related to the protective factor of summer programming against summer weight gain, as suggested by previous research in this lab.

The cross-sectional nature of this study creates a limitation in the data outcomes. All items on the Site Environmental Assessment form Appendix C: Data Collection FormAppendix C) were based on a one-time observation of the site which provides a very limited view of the environment to which the children are exposed. In addition, no data were collected on any possible outside food sources. In addition, as noted in Kenney's study, children often bring sugar-sweetened beverages and salty snacks with them to summer programming sites.[13] Outside food brought to the site may be contributing to increased consumption of unhealthy foods and beverages, and this factor was not captured during our data collection. Kenney also noted that 25% of campers didn't drink anything throughout their time at camp and water was rarely served. In the current study the availability of water fountains was noted at 90% (18) of sites; however, not all participants may be utilizing this resource and may be choosing to drink sugar-sweetened beverages from other sources (i.e. accessible beverage vending machines, nearby corner stores, etc.).

Other factors contributed to the environment of the site including rules, restrictions, barriers to PA, and other weekly activities. Some rules and restrictions were in place, some of which promote positive site environment and others of which promote a less positive environment. TV was restricted 3.00 ± 0.35 which corresponds to a response of "often", on average, while average time restricted outside was 1.21 ± 0.27 or a response of "rarely". Some outcomes were biased, however, due to site limitations. For example, two sites were local libraries that provided SFSP meals, but did not have any specific programming available.

Therefore, some outcomes such as encouraging PA and restricting screen time activities were either answered in a way that was atypical compared to other sites or simply not applicable due to lack of direct involvement of staff with the children's activities. In addition, many sites closed mid-afternoon and were not open during hours that would be dark, so restricting play outside when it is dark and was not applicable. This may have affected the average score of 2.00 +/- 2.00, which corresponds to a response of "sometimes." Barriers to PA were low, with no adults present to supervise children outside at an average of 0.37 ± 0.23 which corresponds to a response of "strongly disagree" and sports and fitness equipment was too expensive at an average of 1.22 ± 0.30 which corresponds to the site leader response of "disagree". Few barriers to PA and rules and restrictions that promote outdoor play and restricting screen time result in a positive PA environment. Like the positive food environment at these SFSP sites, one can begin to realize the potential association between a positive PA environment and positive health outcomes such as providing a protective factor against excessive weight gain while school is not in session.

Weekly activities were also assessed at each site for whether they had the activity, the number of days per week the activity was performed, and the number of minutes per day spent performing said activity. It is important to note that 90% (n=18) of sites were open Monday through Friday, so the data is more accurately analyzed out of five days, not seven as most sites were not open on the weekend. One site 5% (n=1), a sports training camp, was open seven days per week. It is unknown whether meals were served on the weekend, as well. Another site 5% (n=1), a high school band camp, was open just three days per week in the evening. Data was not collected on whether meals were served on days the camp was not running, Mondays and

Fridays. The meals at this site were served to high school students, however, so due to our focus on elementary-age children, this site may be disregarded in further analyses.

On average, PA was the most frequently performed activity with the longest duration each day at an average of 4.78 ± 0.24 days per week for 144.72 ± 29.83 minutes. This supports the previous conclusion of a positive PA environment due to reinforcement, support, and availability of space or equipment for active play.

Due to lack of site attendance records in the current study, statistical analysis of site environments and potential impacts on child health outcomes (i.e. BMI z-score, waist circumference z-score, systolic blood pressure and diastolic blood pressure z-scores, food security, etc.) could not be assessed. Miller's study on summer meal accessibility and food insecurity shows the impact of the USDA SFSP on low-income children and their level of food insecurity.[14] Their results showed no association between geographic availability and food insecurity, but accessible food programs were associated with significantly lower probability of the most severe form of food insecurity for these children.[14] Miller's study bolsters the results found in the present study, which identifies environmental factors at sites that serve SFSP meals. Although health outcomes have not been assessed in correlation with site environment, one can assume that positive food and PA environments, i.e. access to active play, healthy food options, may lead to positive health outcomes.

The current study did not address whether the SFSP sites required the children to participate in the site's structured programming activities. Although all sites had food from SFSP available, some open sites (i.e. libraries, open recreation centers) allowed children to come and go at any time. Because of this, although there were favorable environments available (i.e.

structured PA activities, sports equipment), the assumption that all children were actively participating in the site programming cannot be made as some may come for the SFSP meals and then leave the site. If this is the case, one can infer that there may be a weaker correlation between the site environment and child health outcomes due to lack of participation in site activities. In Cobern's paper on the SFSP and high rates of food insecurity in Mississippi, one of the topics discussed is how the Mississippi Department of Education and USDA have identified lack of other activities at sites as a barrier to participation in SFSP.[11] Mississippi has a participation rate even lower than the national average, with only 7.2% of eligible children participating in the SFSP. Solutions to increasing participation in the USDA SFSP are needed across the country in order to decrease the rates of food insecurity. If structured programming and positive site food and PA environments are factors improving child health outcomes, children participating in the USDA SFSP may be less food insecure and may also be protected from unhealthy summer weight gain.

Food insecurity and childhood obesity affect non-Hispanic black and Hispanic children more than their white and Asian peers.[3,15] Because of this, it is important to note that 100% (n=20) of sites in this study served children who were predominantly African American. One site was recorded as equal white and African American ethnicities, which explains the total of 105% (n=21) in Table 1: Site Characteristics. In addition, all sites were in urban, low-income areas of Columbus, Ohio. When further studies are conducted, a more representative sample should be taken to account for variables such as ethnicity, income, and geographic location.

Conclusions

Obesity and food insecurity are issues of concern for child health in the United States today. In order to address this problem, factors leading to these serious nutritional health-related concerns must be identified. The current study begins to uncover possible environmental factors that affect child health especially during the summer months, a significant window of risk for unhealthy weight gain. Factors such as site food environment, available PA environment, staff support, and staff modeling behaviors may be contributing to child health outcomes. Further research compiling site environment data and child health outcomes is needed in order to reform policy to ensure child accessibility to positive environments during the summer months and improve child health outcomes.

Additionally, to date there are few systematic evaluations of the nutrient content of meals served through the USDA SFSP.[16] In Kenney's study, they concluded that the nutritional quality of foods served could be improved based on their analysis which showed frequent consumption of grain-based desserts and salty snacks, and limited consumption of fruits and vegetables.[13] When analysis of the SFSP menus are complete, the current study will build on the previous study conducted by the lab and provide a greater amount of evidence for the need to update the nutritional standards of meals and snacks served through the USDA SFSP. A more in-depth analysis of the food environment at summer structured programming sites is needed, specifically foods served through the USDA SFSP.

Works Cited

1. Skinner AC, Ravanbakht SN, Skelton JA, Perrin EM, Armstrong SC. Prevalence of Obesity and Severe Obesity in US Children, 1999-2016. *Pediatrics*. February 2018:e20173459. doi:10.1542/peds.2017-3459
2. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of Childhood and Adult Obesity in the United States, 2011-2012. *JAMA*. 2014;311(8):806. doi:10.1001/jama.2014.732
3. Coleman-Jensen A, Rabbitt M, Gregory C, Singh A. *USDA ERS - Household Food Security in the United States in 2016*.; 2017. https://www.ers.usda.gov/publications/pub-details/?pubid=84972. Accessed March 12, 2018.
4. Congress 79th. *The National School Lunch Act*.; 1946.
5. Congress 90th. *The National School Lunch Act Amendment of 1968*.; 1968.
6. Summer Nutrition Programs - Food Research & Action Center. http://frac.org/programs/summer-nutrition-programs. Accessed March 12, 2018.
7. Baranowski T, O'Connor T, Johnston C, et al. School Year Versus Summer Differences in Child Weight Gain: A Narrative Review. *Child Obes*. 2014;10(1):18-24. doi:10.1089/chi.2013.0116
8. Franckle R, Adler R, Davison K. Accelerated Weight Gain Among Children During Summer Versus School Year and Related Racial/Ethnic Disparities: A Systematic Review. *Prev Chronic Dis*. 2014;11:130355. doi:10.5888/pcd11.130355
9. Briefel RR, Crepinsek MK, Cabili C, Wilson A, Gleason PM. School Food Environments and Practices Affect Dietary Behaviors of US Public School Children. *J Am Diet Assoc*. 2009;109(2):S91-S107. doi:10.1016/j.jada.2008.10.059

10. Hopkins LC, Fristad M, Goodway JD, et al. Camp NERF: methods of a theory-based nutrition education recreation and fitness program aimed at preventing unhealthy weight gain in underserved elementary children during summer months. *BMC Public Health*. 2016;16(1):1122. doi:10.1186/s12889-016-3765-7

11. Cobern JA, Shell KJ, Henderson ER, Beech BM, Batlivala SP. The Summer Food Service Program and the Ongoing Hunger Crisis in Mississippi. *J Miss State Med Assoc*. 2015;56(10):300-302. http://www.ncbi.nlm.nih.gov/pubmed/26863842. Accessed April 7, 2018.

12. Gittelsohn J, Anderson Steeves E, Mui Y, Kharmats AY, Hopkins LC, Dennis D. B'More healthy communities for kids: design of a multi-level intervention for obesity prevention for low-income African American children. *BMC Public Health*. 2014;14(1):942. doi:10.1186/1471-2458-14-942

13. Kenney EL, Lee RM, Brooks CJ, Cradock AL, Gortmaker SL. What Do Children Eat in the Summer? A Direct Observation of Summer Day Camps That Serve Meals. *J Acad Nutr Diet*. 2017;117(7):1097-1103. doi:10.1016/j.jand.2017.01.026

14. Miller DP. Accessibility of summer meals and the food insecurity of low-income households with children. *Public Health Nutr*. 2016;19(11):2079-2089. doi:10.1017/S1368980016000033

15. Hales CM, Carroll MD, Fryar CD, Ogden CL. Prevalence of Obesity Among Adults and Youth: United States, 2015–2016 Key findings Data from the National Health and Nutrition Examination Survey. 2015. https://www.cdc.gov/nchs/data/databriefs/db288.pdf. Accessed April 2, 2018.

16. Hopkins LC, Gunther C. A Historical Review of Changes in Nutrition Standards of USDA Child Meal Programs Relative to Research Findings on the Nutritional Adequacy of Program Meals and the Diet and Nutritional Health of Participants: Implications for Future Research and the Summer Food Service Program. *Nutrients*. 2015;7(12):10145-10167. doi:10.3390/nu7125523

Appendix A: Training Powerpoint

Goals

- To what environments – dietary, social, and physical activity – are children who participate in structured programming during the summer months exposed
  - So…will a healthy dietary environment, positive social environment, and an environment that encourages physical activity protect these kids from unhealthy summer weight gain compared to kids who aren't in structured programming?
- To explore the quality of meals and snacks served to children
  - But what if these kids are being exposed to a poor dietary environment? Are they more likely to also gain the unhealthy weight during the summer months like their peers who aren't in structured programming at all?

SWEAT Site Environmental Assessment Protocol

- This form will tell you:
  - How to locate files
  - Site recruitment and main community contacts
  - How to set up appointments and collect data
  - How to fill out each section of the SWEAT Site Environmental Assessment Form
  - How to check and enter the data
- A copy of this will be available on BuckeyeBox

SWEAT Site Environmental Assessment Form

- See handout for example of form
- A copy of this will be available on BuckeyeBox

What I need from you

- **Data Collection**
  - Actually going to sites and collecting the data
  - A lot of observational data, but also some questions to go through with staff
- **Data Management and Entry**
  - "Behind the scenes" work
  - Shouldn't be difficult, just time consuming!
  - I will train you individually and show you exactly what to do
- PLEASE let me know if you are interested in helping with data entry as well!

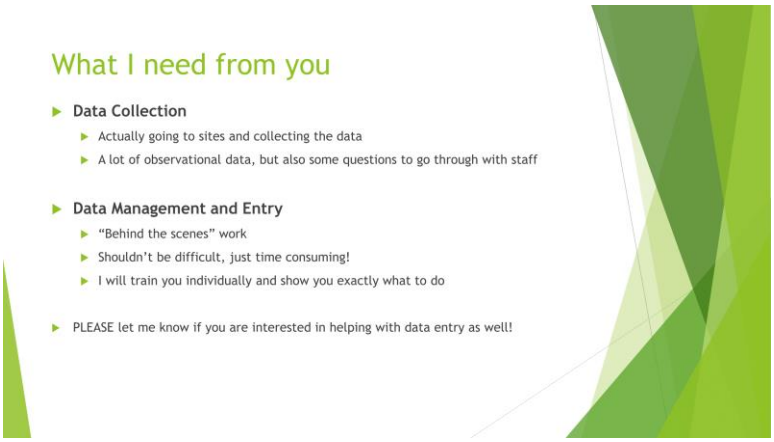
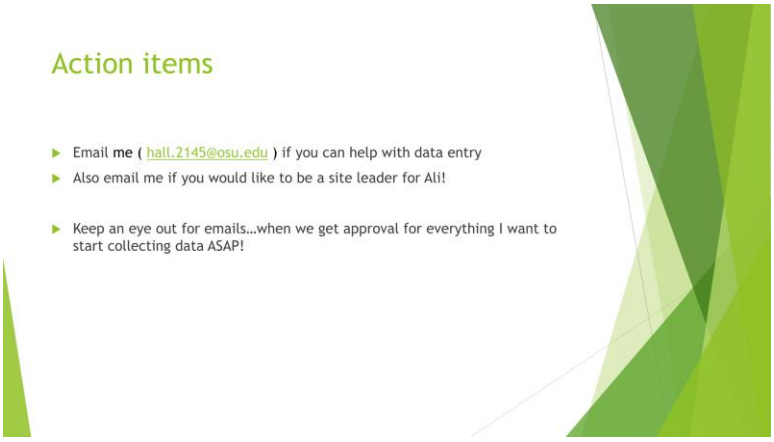


Plate Waste Project

- With Alison Webster
- More training for this part of the project
- Collect data at schools during lunch hour using finished lunch trays
  - July 17-July 28
- Need a leader for each site!

Action items

- Email me (hall.2145@osu.edu) if you can help with data entry
- Also email me if you would like to be a site leader for Ali!
- Keep an eye out for emails...when we get approval for everything I want to start collecting data ASAP!



Appendix B: Consent Form

The Ohio State University

Community Stakeholder Consent to Participate in Research

Study Title: **Summer Weight and Environmental Assessment Trial (SWEAT)**

Researcher: **Dr. Carolyn Gunther**

Sponsor: **USDA NC-NECE Grant**

This is a consent form for research participation.
It contains important information about this study and what to expect if you decide to participate.

Your participation is voluntary.
Please consider the information carefully. Feel free to ask questions before making a decision of whether or not to participate. If you decide to participate, you will be asked to sign this form and will receive a copy of the form.

Purpose:
The purpose of the SWEAT program is to learn about what kids are doing during the summer months. The SWEAT research team is interested in knowing what children are eating during the summer and what activities they are participating in and how these two things may affect their health. We want to compare summer months to school year months.

Procedures/Tasks:
Due to your position in the community as a staff member at a summer structured programming site, you are an expert of this site. We are requesting that you assist us in completing a site environmental assessment form. This form asks about the food and physical activity environment of your site. There are also questions about the staffs' engagement in physical activity with the kids. We will also be collecting information on the food served and the amount of food the kids throw out.

All identifying information will be removed from materials used in this interview and the results will be published in aggregate only. You will not receive anything for assisting in completion of this form.

Duration:

It should take us up to an hour to complete this form. Questions that we need to ask you should only take 10-15 minutes of your time.

Risks and Benefits:

There are no known risks to this study. Participation in this study will not provide any particular benefit to you.

Confidentiality:

Efforts will be made to keep your study-related information confidential. However, there may be circumstances where this information must be released. For example, personal information regarding your participation in this study may be disclosed if required by state law. Also, your records may be reviewed by the following groups (as applicable to the research):

- Office for Human Research Protections or other federal, state, or international regulatory agencies;
- The Ohio State University Institutional Review Board or Office of Responsible Research Practices;
- The sponsor, if any, or agency (including the Food and Drug Administration for FDA-regulated research) supporting the study.

Participant Rights:

You may refuse to participate in this study at any time. If you are a student or employee at Ohio State, your decision will not affect your relationship with Ohio State University.

If you choose to participate in the study, you may discontinue participation at any time without penalty. By signing this form, you do not give up any personal legal rights you may have as a participant in this study.

An Institutional Review Board responsible for human subjects research at The Ohio State University reviewed this research project and found it to be acceptable, according to applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.

Contacts and Questions:

For questions, concerns, or complaints about the study, or if you feel that you were harmed as a result of your participation in this study, you may contact Dr. Carolyn Gunther at gunther.22@osu.edu.

For questions about your rights as a participant in this study, or to discuss other study-related concerns or complaints with someone who is not a member of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.

Signing the consent form

I have read (or someone has read to me) this form and I am aware that I am being asked to provide permission for my child to participate in a research study. I have had

the opportunity to ask questions and have had them answered to my satisfaction. I voluntarily agree to permit my child to participate in this study.
I am not giving up any legal rights by signing this form. I will be given a copy of this form**.**

Printed Name of Participant	**Signature of Participant**
AM/PM	
Date and time	

Phone Number #1	**Phone Number #2**

Investigator/Research Staff [TO BE COMPLETED BY SWEAT RESEARCH TEAM]

I have explained the research to the participant or his/her representative before requesting the signature(s) above. There are no blanks in this document. A copy of this form has been given to the participant or his/her representative.

Printed name of person obtaining consent	**Signature of person obtaining consent**
	AM/PM
	Date and time

Appendix C: Data Collection Form

SWEAT Site Environmental Assessment Form

Data Collector:	
Site Name:	
Site ID:	
Date (MM/DD/YYYY):	

FOR OFFICE USE ONLY

Date Checked: _____

Checked By (name): _____

Date Entered: _____

Entered By (name): _____

Section 1. General Site Information

1. **Name of Site Director:** _____
2. **Name of Alternate Site Contact:** _____
3. **Days and Hours of Site Operation:**
   - ☐ Sunday: _____
   - ☐ Monday: _____
   - ☐ Tuesday: _____
   - ☐ Wednesday: _____
   - ☐ Thursday: _____
   - ☐ Friday: _____
   - ☐ Saturday: _____

4. **Is the site a USDA SFSP Site?**
   - ☐ Yes
   - ☐ No

5. **If YES, is the site an open/closed site?**
   - ☐ Open
   - ☐ Closed

Section 2. Site Demographics

6. **Number of Staff:** _____

7. **Predominant Ethnicity of Youth:**
   - ☐ African American
   - ☐ Hispanic
   - ☐ Asian
   - ☐ White
   - ☐ Other:_____

8. **Do the majority of the youth live in the neighborhood?**
   - ☐ Yes
   - ☐ No

9. **If no, where do they come from?** _____

Section 3. Physical Environment

10. **Number of Rooms:**
    (only those accessible) _____

11. **Number of Ongoing Activities:** _____

12. **List of Ongoing Activities:**
    (based on observation-announcement flyers, posted activities schedule, notice board etc.) _____

13. **Purpose of Main Room:**
    (i.e. dining [cafeteria]) _____

14. **Purpose of Other Accessible Rooms:** _____

15. **Indoor Gym:** ☐ Yes ☐ No

16. **Outdoor Gym:** ☐ Yes ☐ No

17. **Indoor Basketball Court:** ☐ Yes ☐ No

18. **Outdoor Basketball Court:** ☐ Yes ☐ No

19. **Outdoor Playground:** ☐ Yes ☐ No

20. Outdoor Field: ☐ Yes ☐ No

21. Outdoor Track: ☐ Yes ☐ No

22. Parks within 1-2 mile radius: ☐ Yes ☐ No

23. Television(s): ☐ Yes, Number: _____ ☐ No

24. Computer(s): ☐ Yes, Number: _____ ☐ No

25. Video Game Console(s) ☐ Yes, Number: _____ ☐ No

26. Number of Food/Nutrition/PA Signs, Posters, etc. _____

27. Content of Food/Nutrition/PA Signs, Posters, etc. _____

28. Additional Comments: _____

Section 4: Food Source Environment

	Available?	Number	Are the options healthy (H), unhealthy (UH), or a mix (M)?	Comments:
29. Snack Vending Machines:	☐ Yes ☐ No	_____	☐ H ☐ UH ☐ M	_____
30. Beverage Vending Machines:	☐ Yes ☐ No	_____	☐ H ☐ UH ☐ M	_____
31. Water Fountains:	☐ Yes ☐ No	_____	☐ H ☐ UH ☐ M	_____
32. Concession Stand:	☐ Yes ☐ No	_____	☐ H ☐ UH ☐ M	_____
33. Other:	☐ Yes ☐ No	_____	☐ H ☐ UH ☐ M	_____

Section 5: Site Activities

	Yes/No	Brief Description	Number of Days per Week	Approximate Length of Time per Day
34. Arts and Crafts:	☐ Yes ☐ No			
35. Reading:	☐ Yes ☐ No			
36. Television Activity : *(i.e. movie day/hour)*	☐ Yes ☐ No			
37. Computer Activity : *(i.e. computer time)*	☐ Yes ☐ No			
38. Videogame Activity:	☐ Yes ☐ No			
39. Physical Activity:	☐ Yes ☐ No			
40. Other Camps/Programs:	☐ Yes ☐ No			

Section 6: Physical Activity Environment

Please respond to the following statements and questions.

Modeling						
Question/Statement:	**Never**	**1x per week**	**2x per week**	**3x per week**	**4x per week**	**Daily/5x per week**
41. How often do you participate in VIGOROUS physical activity?	0	1	2	3	4	5
42. How often do you participate in MODERATE physical activity?	0	1	2	3	4	5
43. How often do you participate in SEDENTARY activity?	0	1	2	3	4	5
44. How often do other staff members/volunteers participate in VIGOROUS physical activity? ____ Not applicable	0	1	2	3	4	5
45. How often do other staff members/volunteers participate in VIGOROUS physical activity? ____ Not applicable	0	1	2	3	4	5
46. How often do other staff members/volunteers participate in MODERATE physical activity? ____ Not applicable	0	1	2	3	4	5
47. How often do the children at your site participate in SEDENTARY physical activity?	0	1	2	3	4	5
48. How often do the children at your site participate in MODERATE physical activity?	0	1	2	3	4	5

49. How often do the children at your site participate in SEDENTARY physical activity?	0	1	2	3	4	5

Reinforcement						
Question/Statement:	**Never**	**<1x per week**	**1-2x per week**	**3-4x per week**	**5-6x per week**	**Daily**
50. How often do you encourage the children to go outside?	0	0.5	1.5	3.5	5.5	7
51. How often do you praise the children for participating in physical activity?	0	0.5	1.5	3.5	5.5	7
52. How often do other staff members/volunteers praise the children for participating in physical activity?	0	0.5	1.5	3.5	5.5	7

Social Support						
Question/Statement:	**Never**	**<1x per week**	**1-2x per week**	**3-4x per week**	**5-6x per week**	**Daily**
53. How often do you actively participate in physical activity with the children?	0	0.5	1.5	3.5	5.5	7
54. How do other staff members/volunteers participate in physical activity with the children? ____ Not applicable	0	0.5	1.5	3.5	5.5	7
55. How often do you provide support for the children to participate in physical activity?	0	0.5	1.5	3.5	5.5	7
56. How often do other staff members/volunteers provide support for the children to participate in physical activity? ____ Not applicable	0	0.5	1.5	3.5	5.5	7

Family-Related Barriers					
Question/Statement:	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
57. There are no adults present here during daylight hours to supervise the children in active play outside.	1	2	3	4	5
58. Sport and fitness equipment items are too expensive for us to buy for the children.	1	2	3	4	5
Rules and Restrictions					
Question/Statement:	**Never**	**Rarely**	**Sometimes**	**Often**	**Very Often**
59. How often do you restrict the amount of time the children watching television?	1	2	3	4	5
60. How often do you restrict the amount of time the children spend outside?	1	2	3	4	5
Question/Statement:	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
61. The children must be supervised when playing outside.	1	2	3	4	5
62. The children must be supervised when watching TV.	1	2	3	4	5
63. The children must be supervised when using the internet.	1	2	3	4	5
64. I don't allow the children to play outside after dark.	1	2	3	4	5
65. During mealtime, I do not allow the TV to be on.	1	2	3	4	5
66. The children are not allowed to watch TV or play video games until he or she finishes his or her homework.	1	2	3	4	5

Environmental Availability						
Question/Statement: Do you have the following at this site?	**Yes**	**No**				
67. Swimming pool?	1	0				
68. Trampoline?	1	0				
69. Playground equipment, i.e. swings, sandpit, etc.?	1	0				
70. Basketball hoop?	1	0				
Question/Statement: How often do the children here use the following?	**Never**	**<1x per week**	**1-2x per week**	**3-4x per week**	**5-6x per week**	**Daily**
71. TV with Basic Channels	0	0.5	1.5	3.5	5.5	7
72. TV with Cable	0	0.5	1.5	3.5	5.5	7
73. DVDs/Movies/Netflix/Hulu/etc.	0	0.5	1.5	3.5	5.5	7
74. Game systems, i.e. Nintendo, Xbox, etc.	0	0.5	1.5	3.5	5.5	7
75. Computer	0	0.5	1.5	3.5	5.5	7
76. Internet	0	0.5	1.5	3.5	5.5	7
77. Balls	0	0.5	1.5	3.5	5.5	7
78. Bats/rackets	0	0.5	1.5	3.5	5.5	7
79. Bikes	0	0.5	1.5	3.5	5.5	7
80. Gym equipment, i.e. weights	0	0.5	1.5	3.5	5.5	7
81. Jump rope	0	0.5	1.5	3.5	5.5	7
82. Scooter	0	0.5	1.5	3.5	5.5	7
83. Other toys that encourage active play, i.e. Frisbees, kites, etc.	0	0.5	1.5	3.5	5.5	7

Additional Comments:

Section 7. Site Food Log

	What was served?	# of servings	Did this match the menu plan for the day?	Comments
Breakfast				
Milk:			☐ Yes ☐ No	
Fruit/Vegetable:			☐ Yes ☐ No	
Protein:			☐ Yes ☐ No	
Grain:	Whole Grain? ☐ Yes ☐ No		☐ Yes ☐ No	
Lunch				
Milk:			☐ Yes ☐ No	
Fruit/Vegetable:			☐ Yes ☐ No	
Protein:			☐ Yes ☐ No	

Grain:	Whole Grain? ☐ Yes ☐ No		☐ Yes ☐ No	
Other Food				
	What was served?	**# of servings**		**Comments**
Other Food Served:				

Additional Comments:

Note: Collect as many summer menus as possible.

Section 7: Site Plate Waste

Researcher Name:

Lunch Time:

		Tray #:										
Food Item:	**Standard Serving Size:**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**…100**

Coding: 0= None Wasted; 1= ¼ of Portion Remains; 2= ½ or Portion Remains; 3 = ¾ of Portion Remains; 4= All Wasted

Problems: Put any notes about lunch here (i.e. problems with teachers announcing we are evaluating plate waste, etc.)

Problem 1:
Problem 2:
Problem 3:

Additional Comments:

Appendix D: Letter of Support

TONY COLLINS
Director

THE CITY OF
COLUMBUS
ANDREW J. GINTHER, MAYOR

RECREATION AND PARKS
DEPARTMENT

June 7, 2017

To whom it may concern:

Columbus Recreation and Parks Department (CRPD), a sponsor of the USDA Summer Food Service Program (SFSP), has agreed to partner with Dr. Carolyn Gunther and team at The Ohio State University on Project SWEAT, a prospective observation study examining behavioral and environmental determinants of summer weight gain in children living in low-income neighborhoods in Franklin County, Ohio. Specifically, we support her work by allowing her team to conduct an observational assessment of the food and physical activity environment of our SFSP sites.

Thank you and looking forward to partnering on this work,

Ms. Julie Pruett
City of Columbus
Columbus Recreation and Parks Department

1111 East Broad Street | Columbus, OH 43205 | T (614) 645.3300 | F (614) 645.5801 | www.ColumbusRecParks.com