FRESHFARM FoodPrints Program Evaluation Summary

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Amy Best, PhD, Center for Social Science Research, Department of Sociology and Anthropology, George Mason University (abest@gmu.edu)

Alex Lahr, Research Assistant, Department of Sociology and Anthropology, George Mason University

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What kids eat has sparked an outpouring of public and policy discussion in recent years as increased attention has been given to childhood obesity. Schools play an important role in promoting children's health through the public provisioning of food for young people and their nutrition education. Farm-to-School programs, which may include garden-based learning, food/kitchen labs, and/or farm field trips, are designed to improve students' nutrition knowledge and consumption of fruits, vegetables, whole grains and lean proteins through a hands-on, experiential food and ecology curriculum. Farm-to-School programs operate with the understanding that when schoolchildren have access to healthy foods in school, in conjunction with experiential, hands-on learning opportunities around food origins, dietary health, and a learned appreciation of the food system, they are more likely to consume those foods, and establish healthy and sustainable eating habits that may spread to families and communities. The Farm-to-School curriculum also aims to positively intervene in children's academic performance, with impact in traditional subject standards in science, math, and/or language arts, promote environmental stewardship. A growing body of research has identified a range of positive outcomes of Farm-to-School programs, including changes in dietary habits, development of non-cognitive skills and improved academic outcomes.

FRESHFARM's FoodPrints program (hereafter FoodPrints program) partnered with sociologist Amy Best at George Mason University's Center for Social Science Research to create and implement an evaluation for FRESHFARM's FoodPrints program to assess program impact and to determine if integration of subject standards into the FoodPrints' curriculum makes it a feasible, sustainable program model for contemporary nutrition education. FoodPrints is a District of Columbia Public Schools (DCPS) partner focused on supporting the academic curriculum though gardening, cooking and nutrition. Currently, the FoodPrints program operates in nine elementary schools. This report assesses a) the management and delivery of lessons, b) student engagement with educational content, and c) students' appreciation and consumption of nutritious snacks and meals prepared in the FoodPrints' classroom.

School-age children residing in Washington, DC are at disproportionate risk of obesity and diabetes, especially if low-income. Energy-dense foods, high in sugar, salt, fat and refined carbohydrates are readily available and aggressively marketed to children. Yet access to fresh, local, affordable, nutrient-dense food is limited in many DC communities and households. Many household members do not have knowledge about methods to grow or cook nutritious food, and exposure to and interest in nutrient-dense foods are not actively promoted outside the home. Elementary schools are settings to reach children and their families during a formative period when attitudes and food preferences take shape. Yet teachers do not have adequate time to teach nutrition as an independent subject and are often constrained in their ability to offer immersive science and social studies instruction that provides students with lessons and content that is meaningful and engaging.

During the 2015-16 academic year, over 2000 school-age children participated in FoodPrints' educational activities in six elementary schools. The FoodPrints program runs an in-school experiential lab where students engage in monthly hands-on, developmentally-appropriate lessons that include gardening, cooperative cooking experiences, integration with standards-based academic content, particularly science and social studies and participate in a small shared meal. The participation of classroom teachers and parent volunteers, and the FoodPrints'

materials sent home with students aim to extend learning beyond the FoodPrints' gardens and kitchen labs into students' classrooms and homes.

This program evaluation assesses program implementation and identifies program outcomes in two of the six DC partner public schools operating during 2015-2016 academic year. Methods and evaluation procedures for FRESHFARM's FoodPrints program involved the following research activities: 1) systematic unobtrusive observation of program activities in two elementary schools, Watkins Elementary School and School Without Walls at Francis Stevens, 2) writing field notes of observations, 3) coding and analysis of field notes to identify emergent themes and attitudinal and behavioral patterns in the collected data, 4) a parent survey to assess impact beyond school.

As an exploratory method, observation identifies social phenomena and provides opportunity to appropriately define a conceptual framework to direct more efficient, large-scale studies in the future. Observation provides opportunity to capture the distinct social competencies demonstrated by children, enables identification of the dimensions of the behavioral setting that may constrain healthy behavior and/or create risk disadvantage, and understanding of how participants comprehend content and lessons. Since there is little direct contact between researcher and student or interference or disruption to lessons, unobstrusive observation enables the researcher to be respectful of instructional time.

Two elementary schools, Watkins Elementary School and the School Without Walls at Francis Stevens Elementary School were identified for the evaluation. The FoodPrints program was established at Watkins Elementary in 2009. In 2015, the program was in its first year at School Without Walls. Two students, Alexis Lahr and Kayla Peterson from the Department of Sociology and Anthropology at George Mason University assisted with observations. 19 observations at Watkins Elementary School and 14 observations at School Without Walls at Francis Stevens were conducted for a total of 33 classroom observations across grade levels with the majority of observations clustered around kindergarten and third grade.

The demographic profile of each school is similar in terms of racial composition, percentage of students who are free and reduced-lunch eligible, and are in-boundary. Class size is also similar.

Watkins Elementary School	41% free or reduced price lunch	23 core class size	24% in – boundary	74% black 2% Hispanic/Latino 20% white
School Without Walls	49% free or reduced price lunch	22 core class size	26% in-boundary	58% black 14% Hispanic/Latino 16% white 5% Asian

Students' knowledge of dietary health is measured based on recorded observation of a) evidence of peer-to-peer learning, b) evidence of referencing back to material or information previously

covered, connections to previous materials are introduced in the course of activities, c) evidence of reflection on the content itself. Food appreciation is measured in terms of instances of expressed appreciation of the food prepared and tasted. Appreciation is operationalized as: a) open and positive evaluation of the food item tasted, b) descriptive evaluation of the food prepared and its various ingredients in terms of texture and consistency, c) a willingness to try the food items more than once, d) expressed intention to prepare the food item at home.

In addition to the observations, a parent survey was conducted to assess whether the content learned in the FoodPrints program impacts children's food choices at home. A 16 question survey was sent home in June 2016 with each student in first, second, third and fourth grade who has participated in the FoodPrints program at both schools, with a 20% response rate.

FoodPrints Program Impact

Analysis of observational data collected suggests a high level of student willingness to eat the food that is prepared in the classroom as part of FoodPrints' lessons. Analysis of the observational data also suggests a high level of student engagement with the content during FoodPrints' lessons, and some evidence of students integrating the content from the lesson into peer-level interaction in the classroom as they participate in program activities. As a group, students routinely demonstrated a developing knowledge of nutritional health appropriate to their age group, with expected variance among students. Students also demonstrated knowledge of concepts in core subject areas of math, science and social studies.

Food Prints' in-school experiential garden and cooking labs, run each month, provide a unique and innovative learning environment consistent with age appropriate standards of learning. The program is executed by paid staff members and is reliant on parent and school volunteers and unpaid interns, with some variation in the number of staff between School Without Walls and Watkins. Lessons focused on a range of themes: "Eating the Rainbow", "Investigating ingredients", "Energy dense and nutrient dense foods" to name a few. Lessons were differently coordinated by grade. A major part of the lesson was preparing and eating a small, nutritious meal. Example include an Asian rice and vegetable bowl, Asian spring rolls, chard and basil pesto with a vegetable bar, yogurt parfaits, Belgian buttermilk waffles and apple compote, winter squash and apple curry soup with a cilantro yogurt and baked kalettes, Tuscan kale salad, roasted sweet potato and chili-lime slaw. Garden lessons, an important component of the FoodPrints program, focused on practical aspects of maintaining a kitchen garden, sustainable practices that enable gardens to thrive, as well as content on soil composition, decomposition, plant parts and pollination as part of a science curriculum.

In an experiential learning environment, where hands-on learning is valued, a) students should play an active role in their own learning and teaching should be child-centered, b) information should be communicated clearly and through different channels, c) educators should attend to and capitalize on different strategies of learning, d) include review and reinforcement and checks for understanding, and e) praise should be provided for effort and activity. All were in evidence.

Students were treated as valuable, contributing members of the FoodPrints' classroom. FoodPrints' educators encouraged students to work collaboratively and engaged students by involving them in every step of the process. Non-cognitive skills, sometimes called "soft skills," such as listening to peers, working cooperatively and taking turns were regularly integrated into

lessons and rewarded when practiced. FoodPrints' educators fostered active learning through hands-on activities using different tools for teaching. Their toolkits included visual, auditory and kinetic/tactile approaches. Play and child-led exploration was combined with adult-led opportunity to promote learning. The lessons were carefully paced and comprehensive, with opportunities for reflection. Recorded observations consistently demonstrate a high level of student engagement with the lessons.

Enriching Science, Social Studies, Language Arts and Math curriculum

Food Prints' educators utilized a range of teaching tools to provide opportunity for real world application of core subject matter concepts in math, science and language arts. Recorded observations suggest studying food, nutrition, agriculture and cooking can enrich language arts, science, social studies and a math curriculum. FoodPrints' lessons often linked to content being covered by classroom teachers. For example, a second grade lesson was organized around "technology in the kitchen: old and new" which coincided with a second grade unit focused on technology and simple machines. Another FoodPrints' lesson for a fifth grade class helped to anchor themes around Western expansion, which was part of their social studies unit.

Subject content in math and science was embedded in each lesson on dietary health. In several lessons, students practiced ratios and measurement and applied measurement concepts to the task at hand. Students had opportunity to reinforce their understanding of ratios in an accessible, experiential and hands-on format by making salad dressing. Students had regular opportunities to apply math and science concepts which were woven through garden and cooking lessons. Students were regularly encouraged to make predictions and hone their observational skills, using all five senses in the course of the lesson. Students were regularly called upon to provide definitions of scientific concepts. FoodPrints' educators talked about hypothesis formation and cause and effect. Students had opportunity to dissect a flower, learn about pollination, decomposition and the importance of worms for soil. They identified plant parts, invertebrate species, and learned to differentiate wheat germ, endosperm and bran. The lessons were most effective when the FoodPrints' educator reminded students that they were applying math, as well as science concepts as they harvested from the garden and collectively prepared the shared meal.

Students practiced making predictions, evaluated the real world evidence before them, and were encouraged to draw conclusions based on evidence. The ability to ask questions that allowed for a meaningful exchange of information appeared frequently in the field notes. Classroom teachers and parent volunteers both played an active role in facilitating the process of learning, helping students sort knowledge by asking pointed questions and affirming as valuable the content covered in the FoodPrints' classroom.

Lessons also promoted critical consumer literacy as a health strategy. Students learned strategies to be more scrutinizing consumers of the food offered as part of an industrial food diet. Lessons focused on how to read consumer labels for nutrition facts, how to identify deceptive advertising and how to advocate as consumers for healthier food options in the marketplace. At both schools, Food Prints' educators and interns modeled behavior consistent with sustainability goals such as learning to distinguish trash, compost and recycling.

Food Prints' educators recognized that children's knowledge of dietary health existed on a continuum with some children having little to no knowledge about nutritional health and others

having significant knowledge. Students often had bits and pieces that needed channeling into a more coherent whole. While evidence of knowledge gained was difficult to verify because observed demonstrations of knowledge could not be compared against existing knowledge, there was ample demonstration by students of understanding the subject content presented and connections being made. There were noted instances of students referring back to specific material previously covered in the FoodPrints' classroom, which can be taken as evidence of students' developing nutritional knowledge. Students also demonstrated knowledge gained in peer-to-peer learning.

Appreciation and Consumption of Nutritious Food

A core aim of the FoodPrints program is to introduce nutritious foods to children in a school setting and promote their interest in eating nutritious food as a regular part of their diet. The recorded observations suggest a deep level of student engagement and interest in trying new foods that promote body health. Appreciation of the foods prepared and tried was openly and readily expressed by the vast majority of students and is perhaps the most persuasive piece of evidence in support of program impact.

Appreciation for the food tried was often expressed in terms of open admiration. Requests for second helpings and even "thirds" were common at both schools, suggesting genuine enthusiasm to eat the food prepared in the FoodPrints' classroom. Liking the vegetables and meals prepared was a source of pride and opportunity for boasting to fellow students. During the thirty-three observations, few instances of students refusing to try the food prepared were recorded.

Students learned how to evaluate the foods they tried. Prior to meal preparation at Watkins, students were told they could offer "one thumbs up" which means "It's good. I liked it," or "Two thumbs up" which means "Incredible, I want more." While students are not allowed to give a "thumbs down", they can express a "sideways" thumb, which was described as meaning, "No thank you, my taste buds are not mature enough." The idea that taste buds are developing and changing was revisited at each lesson and reinforced the idea that although students do not like something now, they may like it in the future. At Watkins, students are reminded before each tasting that they are not allowed to, "Yuck my yum." Students overwhelmingly embraced this system of evaluation. Of the 33 observations, in which hundreds of students were observed, the research team recorded less than five instances of a student referring to the food prepared negatively. We recorded several instances of students preemptively announcing, "Don't yuck my yum." These instances are documented cases of norming behavior, whereby the peer group exercises influence over other students, encouraging behavior that conforms to collective and organizational behavioral norms. Likewise, at Schools Without Walls, before taking their first bite together, students are reminded of appropriate responses. Students can say "yes please," and "no, please" but outright rejection of the food was considered inappropriate.

There are several mechanisms explain why students are so willing to consume the nutritious food they prepared in the FoodPrints' classroom. Some research has demonstrated that students eat nutritious food when they have opportunity to prepare it themselves. Other research suggests greater knowledge about where food comes from drives young people's interest in eating unfamiliar and nutritious food. Evidence of these mechanisms were recorded in each observation, but equally meaningful for program success was the shared activity of *taking the first bite together*- a collective act serving to promote social cohesion and shared focus. The

success of the program depends on high levels of student buy in. The shared ritual of taking the first bite together helped to facilitate students' investment in the FoodPrints program and the formation of group norms to which students were held accountable by their peers.

Based on recorded observations, there is substantial support for the claim that children are more willing to try nutritious food and express appreciation for the foods they try when students have access to healthy foods combined with experiential learning opportunities.

Impact beyond Schools

An additional objective of the FoodPrints program is to cultivate eating practices that promote dietary health among children and extend beyond the classroom to their homes and communities. To assess program impact beyond school, we administered surveys to a sample of 500 parents with a child who participated in the FoodPrints program during 2015-2016. Findings from the completed surveys suggest that FoodPrints' impact on childrens' knowledge of healthy foods and their willingness to eat healthy food has been positive.

Table 1:

	MINIMAL IMPACT	**SOME IMPACT**	**HIGH IMPACT**
Food Prints program on child's willingness to eat nutritious food	School Without Walls 16% Watkins <1%	School Without Walls 19.4% Watkins 27%	School Without Walls 61.2% Watkins 66.6%
Food Prints program's impact on child's interest cooking nutritious food at home	School Without Walls 22.5% Watkins 8.5%	School Without Walls 22.5% Watkins 30%	School Without Walls 54.8% Watkins 60%
Food Prints program's impact on child's knowledge about nutritious food and cooking	School Without Walls 19.4% Watkins < 1%	School Without Walls 22.5% Watkins 23.6%	School Without Walls 58% Watkins 72%

Survey responses suggest program impact has been greater for students and their families at Watkins Elementary where the program began in 2009 and students who have been able to benefit from the cumulative FoodPrints programming, compared to School Without Walls at Francis Stevens, where the program is new. It is worth noting that the infrastructure and resources to support the FoodPrints program at Watkins is more substantial than at School Without Walls. Watkins has a full kitchen and cooking lab, an established vegetable and herb garden, and more staff. The cumulative impact of the FoodPrints program for students is further supported by observations across grades. Kindergarten students were more likely to reject the

food introduced as part of the FoodPrints program than were the third and fourth grade students. Thus, broadest impact appears to occur over time. Given the curricular scaffolding of the FoodPrints program, which builds each year with reinforcement and content reviews, the greatest impact is likely to be realized longitudinally.

Conclusion

This evaluation suggests that the FoodPrints program, in its current form, is an important change agent, helping to positively frame children's relationship to food, shape schools' capacity for nutritional education, and support the broader academic mission of DCPS in its integration of subject standards into its food and garden curriculum. The program fosters a culture of health in public schools through its teaching of nutrition knowledge and its practical application of dietary health concepts.

Recorded observations suggest a high level of student willingness to eat the food that is prepared in the FoodPrints' classroom at both schools. Students overwhelmingly expressed positive feedback about the shared meal. Recorded observations also provide evidence of a very high level of student engagement with the content during FoodPrints' lessons with evidence, though less robust, of students integrating the content from the lessons into peer-level interaction as they participate in program activities. As a group, students routinely demonstrated a developing knowledge of nutritional health appropriate to their age group, with some expected variance among students. Students also demonstrated knowledge of concepts in core subject areas of math, science and social studies. Evidence from this evaluation suggests that FRESHFARM's FoodPrints program is a feasible and sustainable program model for contemporary nutrition education and is able to successfully integrate subject standards into its curriculum.