

Eliminating *Food Noise*: Using Anthropological Perspectives in an Out-of-the-Box Approach to  
Changing Schoolchildren's Eating Choices

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## Abstract

This undergraduate thesis will explore existing methods surrounding healthy-lifestyle school based interventions targeting elementary and lower-middle school children. Although some studies have reported school-based nutrition interventions to be successful, reports of positive outcomes have been variable. Using anthropological approaches to thinking about eating and food, this thesis offers a critique of intervention methods and examines how they can be made more effective. In the US, the nutrition components of many school-based interventions place great emphasis on a nutrient-focused view of healthy eating. The present analysis argues that such emphasis creates a decision-making environment overloaded with *food noise*. Food noise encompasses the idea that discrepancies between foods that are and are not considered “healthy” are trivial, contradictory, and unnecessarily complicate a child’s relationship with food as he attempts to develop eating habits. In suggesting ways to reduce food noise, this thesis will draw upon five main sources of data: i) participatory observation of a collaborative project between the University of Pennsylvania, the Agatston Urban Nutrition Initiative, and the School District of Philadelphia, ii) interviews with teachers and staff at an elementary school, and with an AUNI staff member, iii) observation at community meetings on school wellness, iv) observations of a local organization’s socialized lunch program, and v) observations of a pediatric weight management clinic. Synthesizing these data sources using anthropological perspectives, this thesis will suggest that future school-based interventions should diminish food noise in an environment that enhances exposure, exploration, and experience.

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## **Background to the Research Problem**

Childhood overweight and obesity in the United States have reached epidemic proportions. In the year 2007-08, 16.8 percent of American children had a body mass index (BMI) equal to or greater than the 95<sup>th</sup> percentile; these rates did not change significantly in 2009-10 (Carroll, Flegal, Kit et al. 2012). Perhaps even more worrisome are the co-morbidities associated with obesity. Type II diabetes, stroke, hypertension, and sleep apnea—all of which have been associated with childhood obesity—are detrimental in part because of their ability to persist as a child grows and becomes an adult (Sharma 2011). Indeed, the health of our nation is at a critical point where the current generation of overweight and obese youth might have a shorter life expectancy than their parents.

This is not to imply that public health organizations, or American parents for that matter, are ignorant of the prevalence of pediatric overweight and obesity. In fact, one might reasonably argue that ignorance is exactly opposite of what is happening. Public health organizations seem to try to raise awareness of pediatric overweight and obesity in hopes of producing strong feelings and immediate action. However, a hyper-awareness of the prevalence of pediatric overweight and obesity might promote adults to develop one of two courses of action. The first might be that an individual's awareness of the problem leads them to feel like they cannot do anything about it. This might be reflected in parents who claim to be too busy to prepare a meal for the children or too overwhelmed by the quantity of information they hear about what they should or shouldn't feed their children. The second might be that an individual's awareness leads to panic, which drives him or her towards extreme and hyperbolic behaviors. Such extreme behaviors might include parents not allowing their children to indulge in an occasional sweet, having an inflexible attitude towards what foods can and can not be incorporated into their children's diets (outside of the domain of food allergies), or—in extreme cases—depriving their children of calories or dietary fat. However, both courses of action seem like they would be ineffective in approaching pediatric overweight and obesity in that neither promotes reasonable or rationale action.

There are many examples of public healthy organizations spending a great deal of time and funding on exploring solutions to pediatric overweight and obesity. Common public health strategies for decreasing the prevalence of obesity include promoting breastfeeding, limiting screen time, encouraging physical activity, increasing fruit and vegetable consumption,

controlling portion sizes, and limiting sugary drink consumption (Sharma 2011). Such strategies are executed as interventions that occur in a variety of settings, ranging from community, recreation, and religious centers, to non-profit and governmental centers, to other public and private gathering places. Additionally, there is a great deal of research pertaining to childhood obesity interventions that take place in schools, either during the day or as part of an after-school program. Schools are regarded as good sites for interventions because they are education settings that also provide children with one to two meals a day (Borradaile, Foster, Grundy et al. 2008). Many after-school interventions that provide opportunities for physical activity and healthy snacks are thought to be beneficial; the interventions prevent children from being at home where excessive snacking and screen time might be common. Due to the thought that school-based interventions are a good thing for students, is not uncommon for schools to offer students programs that focus on nutrition or physical activity. If these interventions are welcomed in schools throughout America, it is important that we are assured that their methods are effective and that they empower children and families to adopt healthier eating and lifestyle behaviors. Although the general argument is that school-based interventions can be effective, it is perplexing that they co-exist with high rates of pediatric overweight and obesity and it is essential that we examine why this is the case. Perhaps current school-based interventions are effective but just not prevalent enough to impact all children. Alternatively, it might be that the current approaches of school-based interventions are truly ineffective. Analysis of current, conventional interventions will be discussed in this paper in order to explore these two possibilities.

In the United States, both the study of nutrition and the training of nutritional professionals place great emphasis on a nutrient-based approach to healthy eating. Nutritionism, the understanding of food in terms of the nutrients it contains, reduces food to its caloric and micro- and macro-nutrient composition (Scrinis 2008). Nutritionism focused views of eating stem from late 19<sup>th</sup> century efforts to identify direct and definitive relationships between what we eat and how healthy we are. These views reduce food to its nutrient composition. As a result, American dietary guidelines suggest that we eat less of a particular nutrient—such as saturated fat or sugar—instead of less of the actual foods that contain those nutrients—such as red meats or processed sweets (Scrinis 2008).

Nutritionism places emphasis on biochemical reactions that occur as the human body digests food. The food marketing industry makes a point of making explicit the (perhaps false) relationships between the biochemical components of food, such as calories, fat, sodium, and sugar, and certain diseases or health states. For example, the next time you are walking down the cereal aisle of a typical American grocery store, take note of the messages on the cereal boxes. You might note that boxes of General Mills Cheerios® claim that the small, torus-shaped cereal—whether plain, multi-grain, honey nut, or even chocolate in flavor—helps to lower cholesterol. Additionally, you might observe that boxes of Kashi Heart to Heart® Honey-Toasted Oat Cereal state that a serving of the heart-shaped cereal can maintain healthy arteries and promote healthy blood pressure. This type of food marketing, driven by reductionism associated with nutritionism, gives the false idea that there is a definitive and understood truth about the relationship between the composition of an individual’s diet and an individual’s health. In fact, Yates-Doerr 2012 coined the term *nutritional black-boxing* to describe this process of consolidating the relationship between food and the human body into deceptively simple and unproblematic terms.<sup>1</sup> Foods are labeled as “good” or “bad,” as “healthy” or “unhealthy” based on these relationships and within this biochemical context. Many Americans reinforce the reductionist tendencies that are characteristic of nutritionism by immediately associating a food with a certain nutrient. Indeed, a typical American might state that eggs are high in cholesterol, almonds are high in fat, and oranges are rich in Vitamin C.

Given our nutritionism-centered American food culture, it should come as no surprise that many interventions that attempt to reduce a child’s BMI by changing food habits focus on simplified messages regarding the relationship between food and the human body. It is because of this that an average American elementary or middle school student could probably tell you that you should drink milk to make your bones strong, eat carrots to make your vision sharp, or avoid butter because it has a lot of fat. However, by promoting messages to children that reduce and consolidate the relationship between food and an individual, food is taken out of the context in which it is eaten and placed within the biochemical context of the human body.

In fact, Ellyn Satter—registered dietician, licensed social worker, and author with over 40 years of clinical experience guiding Americans in establishing healthy eating habits—maintains

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<sup>1</sup> For the purposes of this thesis, nutritionism will be used to describe conventional views of food and eating in America, with nutritional black-boxing existing under the nutritionism umbrella.

the position that current nutrition policies and interventions have an unintended negative impact on eating attitudes and behaviors (Satter 2007). As demonstrated above, nutritionism-based approaches attempt to achieve a standard of nutrition excellence through cognition, with interventions based on nutrition principles rather than food preferences and food avoidance rather than food enjoyment (Satter 2007). It is interesting to note that the emphasis on cognition over preference and avoidance over enjoyment that is inadvertently—and at times directly—promoted by current nutrition policies is associated with people reporting that eating a healthy diet is too much work, that eating healthy takes the fun out of eating, and that eating foods they prefer or enjoy leads to feelings of guilt (Satter 2007).

In summary, food has many different and variable meanings that interact and overlap with each other. Hyper-reduction of food to its biological function discounts the idea that social, cultural, and individual experiences impact the meaning behind, feelings surrounding, and experience of eating. The hyper-reduction of food and eating in America is reflected in the approaches that many school-based interventions take when educating children on healthy eating and lifestyle behaviors. With this in mind, this thesis will use anthropological approaches to eating and food to enable a critique of approaches of school-based interventions and to look to ways in which such approaches might be altered.

### **Introduction to Conventional, School-based Healthy Lifestyle Interventions**

For the purposes of this paper, school-based interventions taking nutritionism-centered approaches will be referred to as *conventional* interventions, methods, or programs. In order to understand the scope of recent research surrounding such conventional school-based interventions, a total of 49 interventions are reported on below. A meta-analysis of after-school based obesity prevention interventions by Branscum and Sharma (2012) reported on twenty different interventions targeting children in kindergarten to middle school, with the majority of targeted children in 4<sup>th</sup> or 5<sup>th</sup> grade. A second meta-analysis sought to explore dietary education in school-based interventions targeting elementary and middle school students (Sharma 2011). The present thesis includes a review of 39 out of the 45 papers covered in the two reviews. Six interventions from these review papers will not be discussed, either because they targeted upper middle school or high school students, because they did not produce conclusive results, or because researchers were not able to accurately report on results at the time the paper was

published. Additionally, a few other studies not discussed in these two review papers are reviewed and included in my discussion of conventional methods. A summary and discussion of the findings of a total of 49 interventions follows. Although each of these interventions differ in length—spanning weeks, months, or years—all of them had pre-determined start and end dates.

A total of 39 of these 49 interventions focused on an individual's responsibility to make healthy lifestyle changes. These interventions can be divided into three groups: interventions focusing on nutrition and physical activity (see Table 1, Appendix), interventions focusing on nutrition (see Table 2, Appendix), and interventions focusing on physical activity (see Table 3, Appendix). Since individual dietary habits are thought of as modifiable through behavioral change, many of the interventions were grounded in some type of behavioral theory. In fact, roughly half of the 39 interventions were grounded in some type of behavioral theory, with the most common being social cognitive theory (SCT). Social cognitive theory assumes that human behavior can be explained using a reciprocal and dynamic model where personal, behavioral, and environmental factors all interact to form behaviors (McAlister, Parcel, Perry 2008). Social cognitive theory differs from other behavioral and social theories in that it suggests that individuals have the ability to alter or construct their own environment to best suit their needs (McAlister, Parcel, Perry 2008). Therefore, it is understandable that conventional interventions targeting an individual child and aimed at helping him navigate different food environments might be grounded in SCT.

When using a behavioral theory in designing intervention, it is thought to be useful to measure antecedents to behavior that are typically associated with the particular behavioral theory that grounds the intervention (Branscum and Sharma 2012). The most common antecedents to behavior discussed amongst these 39 interventions were *self-efficacy* and *autonomy*. This is not surprising, since both attributes are associated with SCT. Within the context of the interventions and SCT, self-efficacy involves the belief that one is capable of carrying out a particular action that leads to a desired outcome (McAlister, Parcel, and Perry 2008). It is thought to influence an individual's goal choice, perceived ability to reach the goal, and persistence towards in reaching the goal. Self-efficacy and autonomy are often linked, as autonomy is the idea that an individual has control over his or her actions. In terms of eating behaviors, autonomy would translate to control over what an individual decides to and not to eat. When focusing on healthy lifestyle, school-based interventions targeting elementary and lower-



middle school students, it is important to remember that children are not completely autonomous in that they are dependent upon adults for many things. In other words, it would not be completely fair to say that a child is autonomous in making decisions about the foods he eats, as he or she is likely not the person to be stocking the kitchen or providing meals.

Thirteen of the 39 interventions focusing on an individual's role in making healthy lifestyle changes included both nutrition and physical activity components (see Table 1, Appendix). The majority of these interventions defined success as observed overall percent decrease in the average BMI percentile within a group of students. Five of the thirteen interventions included pre-and post- surveys as measurements of success of particular components of interventions by obtaining information about students' attitudes towards nutrition and physical activity as well as their knowledge on these subjects. In addition to BMI measurements and pre and post surveys, four of the interventions defined success as changes in students' self-efficacy and autonomy as evident through pre and post survey methods. Another intervention defined success to be improvements in students' satisfaction with their diet and physical activity habits.

In terms of length, the thirteen interventions ranged from one month to four years; the majority occurred two to three times a week for their duration. Ten of the thirteen interventions reported some type of success, whether it was a decrease in BMI percentile, increase in desire to be physically active, or improvements in nutrition knowledge. The physical activity component of these ten interventions entailed giving students time during and after school to be active either in a structured or unstructured environment. The majority of classroom-based instruction involved lessons on nutrition, health, and physical activity. Nutrition education involved using videos, textbooks and other literacy materials, theater, and classroom based instruction. The goal of education mainly involved increasing nutrition knowledge, which standards of knowledge being guided by the United States Department of Agriculture's *MyPlate* (USDA 2012). Only four of the successful interventions included a hands-on cooking or eating activity as part of the nutrition component. The three interventions that were not successful reported no changes in diet, no improvement in students' desire to be physically active, limited growth in nutrition knowledge, and no significant changes in BMI percentile. The main focus of all three of these interventions was primarily nutrition and physical activity education.

Eighteen of the 39 interventions focused solely on nutrition (see Table 2, Appendix). Nine of the interventions focused on enabling and empowering students to change their diets mostly by incorporating more fruits and vegetables, while nine others sought to provide students nutrition education through the traditional methods as previously described.

Out of these 18 interventions, seven reported successful outcomes. Six of these seven interventions met their goal of compelling students to make dietary changes, which were measured using a pre and post survey method. The eighth intervention focused on nutrition education, defined success as a measured decrease in BMI, and reported a slight decrease in BMI post-intervention.

Seven of the 18 interventions reported limited success. Three of the interventions defined decreases in BMI as a success outcome, while three used pre and post surveys that assessed self-efficacy, perceived control over the food environment, dietary intake, and dietary knowledge as a means of measuring success. One intervention combined BMI measurements with these pre and post survey methods. Out of these seven, five of them focused specifically on nutrition education as a means of changing eating habits. Overall, these seven interventions reported some improvements in BMI percentile and dietary habits, though the reported results were rather vague and inconclusive. Through pre and post survey methods, two interventions reported limited increases in fruit and vegetable as well as water intake.

The final four of the 18 interventions focusing exclusively on nutrition did not report any successful outcomes. Three of these interventions emphasized dietary change and one emphasized nutrition education. All interventions were delivered in a classroom setting and used traditional nutrition education methods such as those previously outlined. In terms of success outcomes, each of these four interventions aimed at decreasing BMI percentile; all reported no significant change in this measurement.

Finally, four of the 39 interventions reviewed focused exclusively on physical activity (see Table 3, Appendix). The main component of each of these interventions entailed providing students with opportunities to be physically active during or after the school day. These interventions involved Pilates, dance programs, stretching, or field games. BMI, pre and post surveys that measured moods and emotions, or cardiovascular fitness assessments were used to determine whether each intervention was successful. Two of these interventions claimed to be successful, as evidenced by decreases in BMI and improvements in cardiovascular fitness. The

other two interventions did not report decreases in BMI, but did report improvements in cardiovascular fitness and decreased presence of depressive symptoms.

While 39 out of the 49 interventions could be categorized into one of the previous three categories, seven other interventions did not seem to exactly fit one of the three groups mentioned above or reported results that are worthy of further discussion and focus (see Table 4, Appendix).

Two of these seven interventions can be connected with each other by nature of their simple structure. That is, they each focused on one, specific main message or focus: one sought exclusively to increase fruit and vegetable consumption, while another sought exclusively to decrease sugar-sweetened beverage consumption. The fruit and vegetable intervention targeted 4<sup>th</sup> and 5<sup>th</sup> grade students in the Los Angeles, CA school district and involved deliverance of standardized nutrition curricula surrounding fruits and vegetables (Erausquin, Kinsler, Prelip et al. 2012). The intervention was entirely executed by classroom teachers, who were used as role models for behavioral change. Overall, the intervention resulted in a 50% reduction in the incidence of overweight and obesity and students reported more positive attitudes towards fruits and vegetables (Erausquin, Kinsler, Prelip et al. 2012). However, these positive attitudes did not translate into behavior change, such as an increase in fruit and vegetable consumption (Erausquin, Kinsler, Prelip et al. 2012). Like the fruit and vegetable intervention, the sugar-sweetened beverages intervention consisted of delivering a classroom-based program to students that targeted decreasing consumption of sugar sweetened beverages. In terms of results, the program claimed to be successful in educating students about the health consequences of drinking sugar-sweetened beverages in excessive quantities. Student reports on consumption of sugar-sweetened beverage suggested a 0.6 glasses decrease in the average daily number of glasses of sugar-sweetened beverages consumed (Sharma 2011).

While a great deal of research focuses on interventions grounded in social cognitive theory, it might be unreasonable to expect an individual, especially a child, to make lifestyle changes on his own. With this in mind, it is important to recognize the impact of environment on the behavioral choices that an individual makes on a daily basis. Therefore, some conventional methods have sought to initiate policy changes. Such policy changes might support an individual in making lifestyle changes by facilitating—or requiring—environmental changes. Two such policy-based interventions are reviewed below.

In Philadelphia, Borradaile and colleagues studied the impact of a school nutrition policy initiative on incidence of overweight and obesity amongst a sample of 4<sup>th</sup> through 6<sup>th</sup> grade students in the school district over a two-year period (Borradaile, Foster, Grundy et al. 2008). The policy initiative included elements such as school self-assessment, nutrition education, nutrition policy, and social marketing (Borradaile, Foster, Grundy et al. 2008). The initiative called for the formation of Nutrition Advisory Groups at each of the ten participating schools. Each group—composed of teachers, principals, parents, and nurses—sought to develop strategies for supporting healthy eating and physical activity habits within their respective school environments (Borradaile, Foster, Grundy et al. 2008). Additionally, all foods sold and served in each school were altered in order to meet nutritional standards based on the Dietary Guidelines for Americans (U.S. Department of Agriculture and U.S. Department of Health and Human Services 2010; Borradaile, Foster, Grundy et al. 2008). Beverages were limited to 100 percent fruit juice, low-fat milk, or water, and snacks were limited to items containing less than seven grams of total fat, two grams of saturated fat, 360 milligrams of sodium, and 15 grams of sugar per serving (Borradaile, Foster, Grundy et al. 2008). In order to increase meal participation and consumption of these and other healthy foods, the Nutrition Advisory Groups incentivized students with raffle tickets. For each meal a student consumed at school or for each healthy snack a student purchased at school or brought from home, the groups gave that student a raffle ticket to win prizes such as jump ropes, basketballs, bicycles, and other items thought to promote physical activity (Borradaile, Foster, Grundy et al. 2008). The educational component of the initiative provided students with 50 hours of traditional, classroom-based nutrition education per academic year (Borradaile, Foster, Grundy et al. 2008). Although the policy initiative was a unique intervention in that it combined many different elements, it still emphasized ideas that are typical in conventional interventions regarding nutrients, food labels, and “healthy” versus “unhealthy” foods. In terms of outcomes, Foster and colleagues reported that significantly fewer students in the intervention schools (those participating in the policy initiative) than in the control schools (those schools not participating) became overweight. However, no differences between the intervention and control schools were observed in the incidence or prevalence of obesity (Borradaile, Foster, Grundy et al. 2008). Furthermore, over the two-year period students in both the intervention and control schools showed similar decreases in self-reported

consumption of calories (energy), fat, and fruits and vegetables (Borradaile, Foster, Grundy et al. 2008).

Barth and colleagues (2001) studied the impact of a separate school-based intervention grounded in policy changes that targeted over 600 students seven to eleven years of age. Ten different schools participated; five of these schools executed the intervention and five of these schools acted as controls. The intervention, called “Active Program Promoting Lifestyle in Schools,” or APPLES, lasted one year and sought to influence dietary and physical activity habits rather than simply increasing students’ knowledge (Barth, Cade, Dixey et al. 2001). One of the main components of the intervention involved having schoolteachers, school administration and parents collaborate on the design and implementation of school action plans by schoolteachers, administration and parents. Although researchers did not thoroughly review the specifics surrounding each of these plans, they did make it explicit that the aim of the plans were to promote healthy eating behaviors and physical activity (Barth, Cade, Dixey et al. 2001). To assess outcomes, BMI was calculated based on height and weight measurements; students also took pre/post surveys on diet and physical activity habits. In terms of results, there were no significant changes in reported physical activity as well as no significant difference in BMI changes between the intervention and control schools (Barth, Cade, Dixey et al. 2001).

The final category of conventional interventions being reviewed includes environmentally focused school-based healthy lifestyle interventions. It is thought that coupling modifications to a food environment with nutrition education might be effective in promoting changes in eating behaviors. Two of these environment-focused interventions examined the impact of modifications to the school environment on eating behaviors. The first intervention, the USDA Fresh Fruit and Vegetable Program (FFVP), was executed in 25 middle schools in Wisconsin (Bica, Jamelske, McCarthy et al. 2008). The specific environmental modification of FFVP was providing children with fresh fruit and vegetable snacks on a daily basis for one school year. Although the main goal of FFVP was simply to increase fruit and vegetable consumption, researchers sought to discover whether changes in attitudes about fruits and vegetables translated to changes in behaviors surrounding fruit and vegetable consumption. Using the pre and post survey assessment method, researchers determined that students whose schools participated in FFVP were more willing to try a new fruit or vegetable than students whose schools did not participate in the program. Overall, students in both groups reported that

they were more willing to try a fruit than a vegetable and that they preferred to try these foods at home rather than at school (Bica, Jamelske, McCarthy et al. 2008). However, more students in the schools participating in the program than in those not participating indicated that they would be willing to try these foods at school (Bica, Jamelske, McCarthy et al. 2008).

The second intervention which focused on the school environment differed from the first in that it did not approach environmental change via changing the types of foods offered, but instead by changing the context in which food, eating, and physical activity exist in schools. This after-school intervention simply provided elementary school students with ample time to eat a healthy fruit, vegetable, or protein snack and participate in supervised, non-structured play (Branscum and Sharma 2012). This program was implemented for one month; sessions occurred every school day for ninety minutes. This program differed from many of the interventions previously reviewed in that it was not grounded in behavioral theory and did not provide students with nutrition education or strategies for making changes in dietary or physical activity habits. However, the program did use BMI and cardiovascular fitness measurements as outcome determinants. For this reason, the intervention was categorized as environmental since it attempted to change the culture of an after-school program in a simple way. Overall, improvements in cardiovascular fitness were reported; there were no improvements in BMI measurements (Branscum and Sharma 2012).

The final type of school-based intervention focused on modifications to an environment targeted the home environment. The intervention was delivered within an after-school program to 4<sup>th</sup> and 5<sup>th</sup> grade students and focused on nutrition and health communication. The culminating product consisted of having students develop a nutrition media campaign. Each campaign had its own key slogan or message—such as, “Fruits and vegetables make you stronger and live longer!”—that was delivered to parents during an assembly at the end of the program (Condrasky, Dave, Dube et al. 2005). The main goals of the intervention were to see whether nutrition education impacted students’ fruit and vegetable consumption, whether a child-developed media campaign impacted parent attitudes about the importance of having children consume fruits and vegetables, and whether positive parent attitudes translated to increased availability of fruits and vegetables at home. In this way, this school-based intervention was unique in that it attempted to link the school and home environments by relying on children as promoters of change at home. After the six-week program, students did not report an increase in

fruit and vegetable consumption but did report an increased desire to eat fruits and vegetables after the intervention. Parents reported having more fruit and vegetable available for their children to consume at home (Condrasky, Dave, Dube et al. 2005).

### **Discussions of Conventional Methods**

In reviewing roughly 49 school-based, healthy lifestyle interventions targeting nutrition and physical activity behaviors, one of the main findings that stands out is the importance of physical activity. As a general trend, the interventions that focused solely on physical activity reported success with greater prevalence than those focusing on nutrition and physical activity or exclusively on nutrition. The fact that the interventions exclusively targeting food and nutrition were the least successful suggests that there is a need to bring attention to and improve the methods of or reasoning behind the ways that food and nutrition are taught to children.

The observed difference in reported success between physical activity-focused and nutrition-focused interventions brings up an important point: current school-based, healthy lifestyle interventions seem to be doing a better job at implementing opportunities for physical activity than they are at implementing opportunities to learn about or explore food. In other words, interventions focused on physical activity or physical activity and nutrition have more experiential components incorporated into them. That is, it seems to be rare among the physical activity interventions that children are told to be physically active, but not given the opportunity to actually be active. However, it is more common for children to receive nutrition education where they are told what foods to and not to eat, but not provided with opportunities to explore these foods. This difference in the amount of experience each of the three types of interventions provides children with might explain difference in success trends between the three types. This is not to discount the role of physical activity in BMI reduction but it is suggestive of the idea that reductions in BMI reflect actually being active versus simply being told to be active. It might be the case, then, that the success of an intervention is not determined by the percentage of the intervention devoted to nutrition or physical activity, but instead by the percentage of the intervention devoted to providing children with meaningful experiences.

Many of the nutrition-focused interventions previously reviewed focused exclusively on increasing a child's level of nutrition knowledge. Although some of the interventions did report post-intervention increases in nutrition knowledge, these increases were not always associated

with or did not translate to eating behavior changes (eg. Erausquin, Kinsler, Prelip et al. 2012). However, there is some research-based evidence that alludes to the important role that exposure to unfamiliar food plays in changing eating behaviors. As previously reported, research on the USDA fruit and vegetable program—FFVP—found that students whose schools offered fruits and vegetables reported a greater desire to try these foods or eat them more regularly (Bica, Jamelske, McCarty et al. 2008). Furthermore, children’s acceptance of foods that have less hedonic appeal—such as foods that are lower in salt, sugar, or fat—is greatly influenced by children’s exposure to and experience with those foods (Birch, Fisher, and Savage 2007). In other words, experience and exposure provide children opportunities to situate new, unfamiliar foods within potentially familiar contexts. Therefore, in attempting to improve the methods of food and nutrition interventions, we should perhaps focus on providing children with experiences that expose them to a wide variety of foods in an engaging and hands on manner. For this reason, food and nutrition interventions must go beyond an “eat this, not that” approach, focus less on improving knowledge as a means of changing food habits, and instead direct attention towards how experience-based opportunities can be maximized within a school setting.

This provides a good opportunity to point out the advantage of approaching how to improve school-based healthy lifestyle interventions from an anthropological point of view. Indeed, the study of food and eating has a long history in anthropology, beginning in the 19<sup>th</sup> century (Dubois and Mintz 2002). The field of anthropology recognizes that norms surrounding food, eating, and feeding are a cultural construct in that they are shared and transmitted socially—by learning through direct or indirect observation (Gulas, Hadley, and Patil 2010). In order to understand choices and behaviors related to food and eating, it is important to understand the context in which those choices are made and those behaviors demonstrated. Furthermore, anthropologists have hypothesized that different norms or models pertaining to child feeding—which are locally and culturally specific—impact how a child is fed in different geographic locations (Gulas, Hadley, and Patil 2010).

An excellent example to demonstrate this is the Japanese *obentō*, a boxed lunch prepared for school children by their mothers. *Obentōs* contain five or six miniaturized courses that have each been carefully prepared, artistically designed, and precisely arranged by Japanese mothers (Allison 1991). To an outside observer, it might seem odd that an adult would spend such a significant amount of time preparing an elaborate meal for a child with a small appetite and



possible limited desire in food (Allison 1991). Therefore, it is worthwhile to examine the cultural codes and norms for food preparation that operate within Japanese culture in order to explain the qualities of the *obentō*. Japanese culture values food appearance—that is, how food looks is equally important as how it tastes (Allison 1991). Food appearance encompasses both presentation style and visual appeal. In terms of presentation style, smallness, separation, and fragmentation are ideal, so portions are bite-sized, served in small amounts in small dishes or trays (Allison 1991). Visual appeal operates under an oppositional code—specific foods are broken or cut up in order to contrast color, shape, or texture (Allison 1991). The value that Japanese culture places on food appearance as expressed through presentation style and visual appeal translates directly to *obentōs*. If an outside observer were to see an *obentō*, he would certainly recognize that food is spatially arranged in a visually appealing way and that the arrangement reflects thoughtfulness and deliberateness and in no way suggests casualty.

Recognizing the importance of understanding the cultural codes and norms—that is, the cultural and social contexts—for food, eating, and feeding within Japanese culture in explaining the practice of preparing an *obentō* has direct application to improving school-based interventions. It is noteworthy that understanding how social context—that is, social policy and environmental and sociocultural influence—affects health behavior has been previously established as necessary for more powerful and effective interventions (Williams 2003). Unlike nutritionism, the field of anthropology recognizes that food and eating exist within and interact with different beliefs and contexts. This is very important. As Crotty indicates, “The act of swallowing divides nutrition’s ‘two cultures’. The post-swallowing world of biology, physiology, biochemistry and pathology, and the pre-swallowing domain of behavior, society, and experience” (1993:109). Nutrition—as a scientific discipline—devotes very little attention to the pre-swallowing aspects of eating, the social nature of eating (Crotty 1993). I would argue that the same can be said for many of the school-based interventions previously reviewed in this paper that use conventional approaches when “teaching” nutrition to school children. There is a great emphasis on aspects of food that are connected to the biochemistry, physiology, and biology of food—such as protein, saturated fat, vitamins, and minerals—and limited emphasis on eating as a social construct and experience. In order to increase focus on the pre-swallowing domain of eating, interventions should provide children with experiential opportunities where they can appreciate the social and cultural contexts in which food decisions are made and food is

eaten in. Unlike interventions that target simply increasing a child's nutrition knowledge, experience-based interventions are essential in guiding a child towards adopting positive eating behaviors and stable eating habits.

As we start to think about and synthesize ways in which experiential opportunities can be incorporated into school-based healthy lifestyle interventions, it is important to address the ways in which the effectiveness of interventions can be measured. If one is looking towards changing existing methods in order to improve them, it is certainly useful to have some type of outcome measurement that might be able to gauge whether the novel methods are more successful than previous ones. There have been recommendations that suggest measuring intervention outcomes by reported dietary behaviors and observed changes in adiposity indices (Sharma 2011). However, both of these have their limitations.

Many of the 49 interventions reviewed used BMI or BMI percentile as the main outcome measurement. However, BMI is challenged as an accurate measurement of health in that it can be misleading. BMI itself is just a number, or rather a percent, that is determined by a mathematical equation where an individual's weight in kilograms is divided by their height in meters squared (Devlin 2009). To determine whether a male or female child aged 2-20 years is underweight, normal weight, overweight, or obese, his or her BMI value is placed on a BMI-for-age growth chart designed by the Centers for Disease Control and Prevention (CDC) male or female BMI-for-age growth chart (Prentice and Jebb 2001; CDC 2009). Plotting the BMI value on the growth chart allows for a visual of how the child's BMI compares with others of the same general population. If a child's BMI falls below the 5<sup>th</sup> percentile, the child is considered underweight. A BMI falling between the 5<sup>th</sup> and 85<sup>th</sup> percentiles is considered healthy or normal weight. A BMI falling between the 85<sup>th</sup> and 95<sup>th</sup> percentiles is considered overweight. Finally, the CDC considers a child with a BMI that lies at or above the 95<sup>th</sup> percentile to be obese (CDC 2011).

One of the reasons that the BMI measurement is challenged is that standards surrounding BMI presume that a typical individual has more fat mass than muscle mass. In other words, BMI standards do not take into account the fact that muscle weighs more than fat. Because of this, a very athletic, fit, muscular individual could be classified as overweight or obese when in reality this person is in excellent physical condition, has low cholesterol, stable blood pressure, and a reasonable resting heart rate (Devlin 2009). In fact, BMI itself is not a direct measure of

adiposity, which is one of the reasons that the measurement is criticized when used to assess risk factors for co-morbidities associated with having a high percent body fat (Devlin 2009). For these reasons, Prentice and Jebb (2001) propose that standards for overweight and obesity should not be based on BMI—which is simply a surrogate measurement of body fatness—but rather on actual measurements of body fat mass.

It is worth emphasizing that the results interventions reported that pertained to BMI were not always straightforward and clear. There were no consistent characteristics or trends that distinguished the interventions that reported decreases in BMI or BMI percentile from those that reported no change. Although judging the success of an intervention based on decreases in BMI is prominent in research, it might be more relevant to judge success on whether an intervention enables a child to adopt stable eating habits. The development of consistent eating habits is perhaps a better indication of actual positive behavior change. This differs from BMI as an outcome assessment in that a reduction in BMI (desirable outcome) might arise from the development of either stable eating habits (desirable outcome) or unstable eating habits (undesirable outcome). In other words, using BMI as an indirect measurement of a child's relationship with eating and food throws in the possibility that a “successful” outcome was not actually achieved by positive changes in eating behaviors.

In order to gauge changes in diet, attitudes, and behaviors some interventions used pre and post survey assessment methods. Since these methods rely on self-reported participant data, it is important to question how accurate the reports are in assessing success and to suggest reasons for limitation. For example, in their school nutrition policy initiative Foster and colleagues reported a decrease in the prevalence of overweight in the intervention schools versus the control schools (those schools not participating) (2007). However, the differences in pre and post reported energy intakes were not significantly different between the two groups (Borradaile, Foster, Grundy et al. 2008). It seems unlikely, however, that changes in energy had no effect on the reduced incidence of overweight seen in the intervention schools. Yet, there was not a clear pattern in reported energy consumption that distinguished the intervention from the control schools in such a way that would support the reduced incidence of overweight in the interventions schools compared to the control schools. Although this brings into question how accurate the information that students reported for this specific study is, it also raises important questions about the validity and accuracy of self-reported data in general.

In fact, this in and of itself has been a topic of exploration of research studies. Of particular interest is the relationship between social desirability and reported behaviors. Social desirability is viewed as the tendency to overestimate desirable traits or behaviors and to underestimate less-desirable ones. It has been previously found that, among adults, higher social desirability scores are positively associated with reports of positive, preventative health behaviors (Harding and Kristiansen 1984).

However, of particular relevance to this thesis is exploring the degree to which social desirability biases children's self-reported eating behaviors or attitudes. An obesity prevention program, Girls Health Enrichment Multisite Studies (GEMS), targeted 8- to 10-year-old African American girls and evaluated the effect of social desirability on self-reported dietary and physical activity measures (Baranowski, Beech, Cullen et al. 2004). Social desirability scores were found using the "Lie Scale," which consisted of nine items assessing socially desirable behaviors, with each item coded as "yes" or "no" (Baranowski, Beech, Cullen et al. 2004). A higher score is associated with a higher level of social desirability. Researchers found that higher social desirability scores positively correlated with overestimates of physical activity and underestimates of sugar-sweetened beverage consumption (Baranowski, Beech, Cullen et al. 2004). When designing outcome assessment measures, therefore, researchers should be cognizant of the relationship between social desirability scores and self-reports of perceived desirable behaviors. One way to do this is to incorporate measurements of social desirability into the intervention so to account for the influence of social desirability scores on self-reported behaviors and attitudes.

In analyzing the quality or accuracy of outcome assessments such as BMI or self-reported pre- and post- survey methods, it is important to bring attention back to and possibly re-examine the ultimate goal of these school-based interventions. Given that BMI is not an accurate measurement of health status, it would not seem to make sense to have reduction in BMI be the ultimate goal of a school-based intervention. This might lead researchers to develop intervention goals more explicitly linked to eating behaviors. Therefore, it is worth bringing attention to the general ideas surrounding what types of eating behaviors American society views as ideal. After all, a school-based intervention focused on eating and nutrition that is designed by Americans and carried out in America would most likely aspire to have participants achieve this idyllic status.

Within the context of food and eating, being a “healthy” eater is often referenced as the ultimate goal that adults have for children. Within American society, healthy eaters are thought to be eaters of “green,” “go,” “yes,” or “eat this” foods. When individuals claim to be healthy or unhealthy eaters, they often name off foods that they eat all the time or foods that they avoid all of the time in order to support their claim of healthy or unhealthy eater status. In order to be in line with cultural views, it would seem that the goal of school-based interventions targeting eating behaviors should be to mold children into healthy eaters as perceived by American society. However, the characteristics of a healthy eater as defined by American society seem to fall in line with ideas reinforced by nutritionism. Within this context, one might reasonably argue that telling a child to be a “healthy” eater within a society filled with black-boxed ideas about what constitutes healthy versus unhealthy foods is a treacherous line to walk, with treachery lying in the possibility of the child adopting a black-boxed, rigid definition of what it means to be a “healthy” eater.

This is not to say that interventions aiming at molding children into “healthy” eaters are innately bad or have poor intentions. In fact, there is certainly value in their efforts in that they attempt to change a child’s eating behaviors as opposed to focusing solely on reducing a child’s BMI. However, it is worth proposing an alternative view of the profile of a “healthy” eater and perhaps using this view when synthesizing the framework of a novel and perhaps more effective school-based intervention.

Instead of focusing on a health-centered approach to eating and food, Ellyn Satter believes that a model of eating competence, coined *ecSatter*, lies at the core of developing positive nutrition behaviors, fostering a balance and sustainable relationship with food, and promoting dietary changes (Satter 2007). In forming a model for eating competence, Satter eschews the use of using moralizing words such as “good” or “bad” when describing foods and eating. *ecSatter* could be said to be slightly anthropological in nature in that it appreciates eating as a complex process that involves learned behaviors, acquired tastes, social expectations, and attitudes and feelings about eating (Satter 2007).

The *ecSatter* model asserts that competent eaters have positive attitudes about food and about eating. They base food selection on enjoyment and pleasure, acknowledge a balance between food desires and food choices, and have a relaxed self-trust when it comes to consuming food (Satter 2007). Competent eaters are confident in their abilities to make choices about

what to eat and what not to eat and about how much to eat or not to eat. This is in part a result of the internal regulation skills of competent eaters. Competent eaters are able to make decisions about food types and quantities to consume because they accept, rely on, and respond positively to inner drives and cues surrounding food selection and regulation (Satter 2007). By recognizing and responding to these cues, competent eaters promote relaxation around food and eating, food acceptance, positive attitudes about food, and feelings of individual food security where one is not anxious about the likelihood of acceptable foods being available (Satter 2007). All of these qualities of a competent eater enable him or her to manage different food contexts. Competent eaters are comfortable in situations that involve eating or preparing various foods, are able to tolerate hunger or appetite cues in order to participate in socially-appropriately timed meals and snack, and respect these mealtimes by setting aside time to eat (Satter 2007).

Competent eaters differ from “healthy” eaters in that the definition of a competent eater goes beyond the specific food choices that an individual makes. As mentioned before, “healthy” eaters are often identified as such based on the foods that they report consuming or avoiding. If the foods that an individual reports consuming on a regular basis are considered “healthy” under the umbrella of nutritionism, he might define himself as a “healthy” eater. However, identifying someone as a competent eater gives a lot more information about his eating behaviors.

Becoming a competent eater requires developing a skill set grounded in experiential opportunities or encounters with food. Through these encounters, an individual is able to make choices about the type, quantity, and timing of food he consumes. Cumulatively, these encounters serve as learning experiences where an individual navigates food within different environments and contexts. After a significant amount of meaningful learning experiences with food, an individual will hopefully have developed the skills necessary to confidently interact with future encounters with both novel and familiar foods.

With these skills of eating competence and confidence in mind—along with understanding the importance of providing children with experiential opportunities to build these skills—it is worthwhile to consider how outcomes of interventions desiring to build these skills in children might be measured. Indeed, the evaluative measures of traditional nutrition interventions would not be appropriate to use. Instead, it might be relevant to develop ways to measure how students are thinking about food, including cooking literacy, cooking self-efficacy, and recipe reading and execution ability (Stein 2013).

In short, as made evident by comparing the success of interventions targeting physical activity with those targeting physical activity and nutrition or nutrition alone, it is clear that providing children with experiential opportunities is important in a school-based interventions. It is also clear that we need to come up with better ways to measure the success of an intervention. When looking to judge the effectiveness of novel methods in order to compare them with previous or existing ones, it is important that there is some type of evidence that suggests that the novel method is impacting children in the way it was originally designed to. Although BMI and BMI percentile are prominent outcome assessment measures, many professionals do not accept them as accurate indicators of health. Furthermore, focusing solely on changes in BMI does not offer much information about changes in overall eating behaviors.

For this reason, researchers have then focused attention on pre and post self-reported survey methods that ask questions about dietary intake, food attitudes, and eating behaviors. The goal of many of these methods is to identify whether a child has become a “healthier” eater over the course of the intervention. However, in a society where “healthy” eating strictly focuses on the types of food that an individual does and does not eat, this does not offer much information about how a child’s relationship with food and eating have changed over the course of the intervention.

Therefore, school-based interventions might benefit from the framework of the ecSatter model, which looks to develop competent eaters. Competent eaters are identified by their attitudes, acceptance, and abilities as related to food. Fostering eating competence in children is entirely dependent on experience and exposure. It is interesting to note that comparison of results between physical activity interventions and those interventions focusing on physical activity and nutrition or solely on nutrition also suggested the importance of providing experiential opportunities for children. Therefore, future directions of this paper will focus on the ways that adults can help engage children with food through experiential opportunities in order to work towards developing competent and confident eaters.

## **Research Methodology**

In reviewing past and current school-based interventions, it is clear that attention needs to be brought to improving the outcomes of interventions that deliver information pertaining to food and nutrition to children. For the purpose of this paper, those improved outcomes will focus

on fostering eating competence and confidence in children by increasing experiential opportunities and exposure. In order to explore how to instill eating competence and confidence in children within a school setting, five main sources of data were used. They include: i) personal experience with a collaborative project between the University of Pennsylvania, the Agatston Urban Nutrition Initiative (AUNI), and the School District of Philadelphia, ii) interviews with teachers and staff at a Philadelphia elementary school, and with the AUNI Student Engagement Coordinator, iii) attendance and observation at community meetings concerning healthy schools, iv) observations of the Vetri Foundation for Children's socialized lunch *Eatiquette* program, and v) observations of a multi-disciplinary pediatric weight management clinic at a major children's hospital. The following section of this paper will go into more detail about each of these five sources of data.

### **i). Personal Experience with the Food Project**

My interest in working with elementary and lower-middle school students within the context of eating and food originated from my participation in a novel academically-based community service (ABCS) course at the University of Pennsylvania in the spring of 2011. The course, titled Food Habits in Philadelphia Communities, sought to explore the intersection of food and culture, learn about food habits of a local diverse community, and consider ways and means for understanding and ultimately changing food habits (Kauer 2011). One of the main components to the course was involvement in the Food Project. The Food Project was a collaborative 10-week project involving undergraduate students and their instructor at the University of Pennsylvania, community partners at the Agatston Urban Nutrition Initiative (AUNI), and a 6<sup>th</sup> grade students and teacher partners at a public elementary school in the city of Philadelphia. In collaboration with a Penn instructor, undergraduate course assistants, and nutrition educator staff, undergraduate students in the course were given the responsibility of preparing weekly lesson plans and activities to be used for the Food Project.

During the Food Project in the Spring of 2011, small groups of 2-3 Penn student mentors partnered with 4-5 6<sup>th</sup> grade students to work together each week to explore everything about food: how we think about it, how it tastes, where it comes from (in terms of geography), where we get it from (in terms of animal versus plant based foods), and what it means to us, to our families, and to our community (Kauer 2011). These elementary student mentee-Penn mentor



placement groups remained consistent throughout the semester. In addition to chopping, arranging, pounding, mashing, cooking, smelling, and tasting a bunch of familiar and unfamiliar foods, the elementary school students had the opportunity to write entries for a book. The book—which is published and bound—was the final product of the Food Project. In addition to photographs, the book was comprised of original poetry, personal reflection, interviews, and recipes that the elementary school students have worked on throughout the project. At the completion of the Food Project, each Penn mentor and middle school student received a copy of the book.

In the spring of 2012 (the second year the ABCS course was offered), my role in the course was as an undergraduate course assistant (TA). That spring, the course had plans of expansion and enrolled enough Penn students to have two separate (but related) Food Projects so that all 5<sup>th</sup> graders at the elementary school could participate. In the spring of 2011, I had the opportunity to play an active role in executing the Food Project; I worked closely with my two Penn partners to create an inviting and exciting environment where we could learn about and explore food with our four 6<sup>th</sup> grade students. Having the role of TA for the course in 2012 allowed me to step back and observe the execution of the Food Project within the broader classroom environment while still being active in planning and improving Food Project lessons. This semester, spring of 2013, there are three Food Projects being run by a total of 20 Penn students at two elementary schools. I am fortunate to be involved with the Project for a third year, my second year as a member of the teaching team.

## **ii.) Interviews**

The success of the Food Project largely depends on the collaborative efforts between university and community partners. The Food Project would not be possible without the involvement of AUNI. Due to AUNI's critical role, I interviewed the director of AUNI Student Engagement. Prior to assuming his current role at AUNI, he was involved with the Food Project as the main nutrition-educator partner. Although he does not have a current role in the classroom of the Food Project, he still very involved in developing the lessons that are executed throughout the Food Project, working in collaboration with the Jane Kauer—the Penn instructor of the ABCS course—undergraduate course assistants, and Penn students.

Other important Food Project community partners include the classroom teachers of the middle school students working with the Penn students. Without their support and engagement with the Food Project, it would be a lot more difficult to gain the support of school administration for the privilege to have the Project happen in the first place. With this in mind, I interviewed two elementary school teachers and one school counselor in a kindergarten- 8<sup>th</sup> grade school in Philadelphia that has participated in the Food Project for three years now. Prior to the interviews, I was familiar with both teachers due to their involvement in the Food Project. The identities of the interviewees will be kept anonymous throughout the paper. In order to distinguish one teacher's quotes from the others, the two teachers will be referred to as "Teacher A" and "Teacher B."

Since it was clear that the two teachers viewed the Food Project as a valuable opportunity for their students, I thought they would be excellent people to interview. Basically, my hope in interviewing them was to capitalize on their experience with the Food Project and in working in an urban elementary school in order to discover what components of the Food Project they thought were effective, what components they thought were ineffective, and where and how they saw room for improvements. I hoped to couple their experience with and thoughts on the Food Project with my observations of and experience with the Food Project, as well as with research on current school-based healthy lifestyle interventions, in order to think about ways that future school-based delivery methods of information about food and nutrition can be more effective.

### **iii.) Healthy Schools Community Meetings**

Since many aspects of childhood obesity, as well as of the functioning of schools, extend beyond the walls of the school itself, I thought it would be valuable to participate in or attend meetings, events, and shadowing opportunities that seemed relevant to childhood obesity, school-based healthy lifestyle interventions, and food and nutrition. On November 27, 2012, I attended the biannual meeting of the Philadelphia School District's Central Level Coordinated School Health Council. The Central Level council's foundation lies in the Center for Disease Control (CDC) Coordinated School Health Model, which attempts to coordinate school wellness services in a systematic way. The model originated from the idea that many school health programs and policies are the result of a wide-variety of national, state, and local mandates, regulations, initiatives, and funding source. This often leads to a patchwork of program,

initiatives, and policies that do not always exist synergistically with each other (CDC 2013). Those involved in the patchwork come from a wide-variety of professional fields, including education, nursing, social work, nutrition, psychology, and school administration. The model suggests that by coordinating these patchwork school wellness services in an organized manner, schools might be able to bridge gaps and reduce redundancies between programs. It also proposes that coordination allows for improvements in teamwork among and communication between the different professionals of the patchwork programs.

Starting in the school year of 2006-07, the federal government mandated that all public school districts be required to establish a local school wellness policy. The United States Department of Agriculture (USDA) views a wellness policy as an important tool in preventing and reducing childhood obesity, promoting student wellness, and assuring that school meals meet federal guidelines (USDA 2013). Glenn Davitt, Wellness Program Coordinator for the School District of Philadelphia (SDP), claims that the current SDP wellness policy is considered one of the best in the state of Pennsylvania and has been used as an example for other school districts (email to author, November 9, 2013). This policy mandates that Philadelphia schools establish coordinated school wellness councils, using the CDC Coordinated School Health Program Model previously described (School District of Philadelphia 2011). It also establishes nutrition standards for all foods sold on school property and mandates that students receive standards-based nutrition and physical education as part of a health education program (School District of Philadelphia 2011). My goal in attending a meeting of the Philadelphia School District's Central Level Coordinated School Health Council was to think about how a classroom-based program focusing on food exploration, such as the Food Project, might fit into the district's wellness policy and vision for coordinated school health.

#### **iv.) Vetri Foundation for Children's Eatiquette Program**

I had the privilege of observing the *Eatiquette* Program, the Vetri method for school lunch, at two Philadelphia charter schools on December 3, 2012. The Vetri Foundation for Children (VFFC) was established to help kids experience the connection between healthy living and healthy eating (Vetri Foundation for Children n.d.). Through programs like Eatiquette, VFFC demonstrates its belief that healthy living encompasses healthy bodies and healthy minds as it strives to give children a nutritional foundation that allows them to grow and thrive.

The ultimate goal of the Eatiquette program is to use food as a tool to empower children, foster community, and inspire change. Indeed, Marc Vetri, founder and board member of VFFC, and executive chef and owner of the Vetri family's restaurants in Philadelphia, believes that school lunchrooms should be regarded as important in providing teachable times to instill positive eating behaviors in children (McIver 2013). Eatiquette transforms a traditional, cafeteria school lunch into a socialized environment where children feel valued and teachable moments can happen. As part of an Eatiquette lunch, children eat a family-style lunch seated at a round table, with real plates and silverware (Vetri Foundation for Children n.d.). The round-table environment addresses the social aspects of eating by encouraging conversations during meals (McIver 2013). Each table has a table captain who wears a special chef's coat and is in charge of delivering his table's lunch. Prior to eating lunch, the chef announces what's for lunch and describes how it he prepared it. Students and teachers then share in the experience of eating lunch together. After eating lunch, table captains serve dessert as a separate course of the meal. Lunch concludes with all children assisting in the clean-up process. VFFC believes that this program provides children with opportunity to learn how to serve each other, to respect those who prepared their lunch, and to appreciate how healthy food makes them feel; it provides teachers and adult volunteers with opportunities to model teamwork, good manners, and willingness to try new foods (Vetri Foundation for Children n.d.).

My goal in observing two elementary and one high school Eatiquette lunches was to see how a novel program uses an environment outside of the classroom to teach children about food in a way that acknowledges the social component of eating and avoids a conventional "eat this, it's good for you" approach.

#### **v.) Multi—disciplinary Pediatric Weight Management Clinic**

Finally, I acted as an observer at the clinic of Healthy Weight Program of the Children's Hospital of Philadelphia. The program aims at improving the health and quality of life of children who are overweight or obese by delivering medical care, providing nutrition and psychological counseling services, and giving suggestions for ways to be physically active (CHOP 2013). By shadowing the pediatricians, nurse practitioners, nutritionists, and physical activity specialists who work at the clinic, I hoped to draw connections between the goals and

efforts of school and medical settings in order to think about ways in which the two can exist truly symbiotically.

## **Analysis and Discussion**

In drawing upon my experience with the above programs and opportunities, as well as in my conversations with members of a Philadelphia elementary and middle school, I have discovered four main “Es” that I consider to be important when promoting and fostering eating competence and confidence in children. They are: i.) Environment, ii.) Exposure, iii.) Exploration, and iv.) Experience.

As I have already mentioned in my discussion of conventional healthy lifestyle interventions and nutrition education programs, methods for delivering physical activity opportunities seem to be more effective and less widely disputed than methods for delivering nutrition education. Therefore, due to the constraints of this paper, I do not wish to focus my attention on this aspect of promoting healthy lifestyles in children. However, what was clear from reviews of these research papers is that many existing nutrition education methods do not seem to be consistently effective in positively impacting children’s attitudes and behavior towards food. I would, then, like to focus on how we can improve the ways that we talk about food with children and the food-related opportunities we provide them with in order to build eating competence and confidence.

### **i.) Environment**

At present, one of the most dominant views about food among popular culture in America is its association with nutrients. In this nutritionism-focused view, food is reduced to terms such as calories, saturated fat, high fructose corn syrup, protein, antioxidants, vitamins, and minerals. The emphasis placed on the terms implies that food can be effectively whittled down to specific and certain components. All of these biochemically-based terms take away from the actual experience and enjoyment of food. For that reason, I will refer to the ideas and terms promoted by nutritionism as *food noise*.

Food noise greatly interferes with Americans’ relationships with food. Upon walking into a typical American grocery store, an adult shopper is bombarded with food noise. The presence of packaged and processed foods labeled and marketed as low fat, fat-free, low-calorie, high-

fiber, low-sodium, no sugar added, and reduced sugar is striking. This can be very overwhelming for an adult, nevermind for a child.

In my experience at the Healthy Weight Clinic at CHOP, I was struck by the comments of one child who said she didn't like spinach but would eat it because it's healthy and another who said that she didn't like milk but would drink it three times a week because it was good for strong bones. To me, this is bothersome. I am confused by how we—as American adults—think it is reasonable for a child to have a healthy relationship with food when they are constantly feeling tension between foods that they feel like they should eat and the foods that they desire to eat. Especially given the alarming and sensitive nature of childhood obesity, it is not fair for children to be immersed in so much food noise and be expected to develop healthy eating habits. Therefore, my main goal in improving the eating component of a school-based intervention is to provide children with an environment where nutritionism-reinforced food noise is kept at a minimum and eating is experienced as eating food and not eating nutrients.

Environment is the first E because first and foremost, the eating and food environment of a school-based intervention where children talk about and interact with food needs to be one in which children feel good about themselves, are confident in their abilities, and respect others. The AUNI Student Engagement Coordinator—and co-developer of the Food Project—echoed these ideas when describing one of the goals of the Food Project:

“The purpose of the project is to bring happy, fun, food-related activities to kids. That's how [the Food Project] was grounded—getting exposure to new things about food into the hands of kids and making sure that it's in a happy environment, a nice place where they are with their peers or with role models, where people are smiling, and where everyone is engaged. That's really all we are trying to do.” (April 10, 2013, AUNI Student Engagement Coordinator)

Although it is difficult to qualitatively measure or express some of these environmental and personal factors the AUNI coordinator mentioned, individuals working with children seem to have the ability to sense whether their students are engaged, comfortable, and confident in their ability to be learners. In reflecting on some of the importance qualities of a productive classroom environment, one of the elementary school teachers discussed how she gauges confidence in her students:

“I see confidence in students when they are not afraid to raise their hand [and] ask questions... when they're willing to be wrong because they're not afraid to be wrong and when they're willing to help someone.” (January 30, 2013, Teacher B)

A bit later, the other elementary school teacher mentioned how to foster an environment where children's confidence can grow:

“Provide children an opportunity to give opinions about things without ridicule. If they have an opinion that is perhaps not the norm of the accepted right or wrong, guide them gently in the right direction as opposed to ridiculing them.” (January 30, 2013, Teacher A)

From this, I might suggest a need for school-based interventions to provide students with opportunities for expression, questions, and opinions. Researchers of previous school-based interventions have not made it explicitly clear whether the nutrition education components of the interventions have had flexibility in providing students with these expressionistic opportunities. In fact, it would not be surprising if such flexible opportunities might be regarded as inconsistent with the rigid and black-box framework of existing methods.

Within the rigid framework, “healthy” food is regarded as static and rigidly defined. Although one might think that statically defining foods would be uncomplicated ideas about whether the food is healthy or unhealthy, nutritionism promotes the same food existing within both categories of healthfulness. In other words, grilled chicken is good because it has protein, but fried chicken (which still has protein) is bad because it contains a lot of fat. Yogurt is good because it has calcium, but ice cream (which has calcium like yogurt) is bad because it has too much sugar. The dual identity of chicken being categorized as both a healthy and unhealthy food excellently illustrates food noise. It does not seem reasonable that we expect children to build confidence with food by black-boxing foods, labeling them as having or not having certain components—such as saturated fat, salt, or sugar—and placing the same food within different categories of healthfulness based on the degree to which they contain such components. It puts unnecessary pressure on children to select certain foods over others and does not set them up to be confident in their abilities to select foods, make judgments about when to eat, or demonstrate competence in controlling how much to eat.

In fact, in delivering nutrition education through black-boxing, we are working against the efforts of classroom teachers as they try to create a flexible, welcoming, and accepting learning environment. Therefore, we need to direct attention away from black-boxed methods of discussing food in order to make conversations about food and eating freer flowing and less rigidly defined. Towards the beginning of my experience as a mentor in the Food Project, the

middle school students in my group were under the impression that I—along with the other mentors—was a nutrition teacher. Our group conversations were initially pretty standard and unexciting. When asked about food preferences, the students would mostly discuss foods they perceived as safe to discuss—that is, healthy foods that they thought we, as mentors, ate exclusively. However, as the Project continued and we explored food habits, our black-boxed conversations changed. Once the students—and the mentors—came to realize and appreciate that the goal of our time together was not to learn that the nutrients in a cucumber are in the skin, that oranges contain vitamin C, or that milk contains calcium which makes bones strong, our conversations became much more relaxed and honest. By sampling breads, chopping fruits and vegetables, grinding spices, and sautéing a stir fry, we had the opportunity to enjoy food as food outside of a rigid context promoted by nutritionism. I have full confidence that throughout the Project, the mentors and I were able to create an environment tending toward non-judgment where students had the opportunity to gain confidence and share their opinions, to ask questions and be curious, and to value the respect that they both gave to and received from all of those involved in the Food Project.

## **ii.) Exposure**

According to the two elementary school teachers involved in the Food Project, students most enjoyed preparing and eating familiar and unfamiliar foods during the Project. This introduces the second E: Exposure. The observation that children in the Food Project were willing to try new foods is brought up by one of the classroom teachers in the following interview excerpt:

“I didn’t see much backing away [during the Food Project]. You’d put it in front of them [and they might be hesitant] but they would taste it anyway. And then they found out that they actually liked some of it.” (January 30, 2013, Teacher A)

Children have an innate desire to act on their curiosity, which can only be fostered if they are provided with opportunities to be exposed to the familiar and the unfamiliar. Exposing children to new and unfamiliar foods provides an ideal opportunity to nurture this curiosity.

It should be noted that identifying children as innately curious does not imply that they have a continual desire to act on their curiosity. As eaters, children face what Rozin (1982) views as the basic dilemma of the omnivore. That is, omnivores face the opposing tendencies of



exploration—being inclined to explore new sources of food—and conservatism—fearing fear new foods as possible poisons (Rozin 1982). Given that children innately have competing impulses of exploration and conservatism, it is important to point out that children might not always be open or receptive to exposure to new experiences. In my interview with the school counselor, she mentioned that one of the things she enjoys most about her job is being able to expose children to things that they might not otherwise be exposed to. On a later occasion, when asked to identify a potential barrier children might face when changing eating habits that schools could do a better job of addressing, she responded with the following remarks:

“I would say exposure...like [children] might have it in their mind that they don’t like something. Part of it is exposure and what you can actually do to make these healthy [foods] taste good.” (January 30, 2013, School Counselor)

It is certainly clear that the two teachers as well as the school counselor value exposure. However, it is very interesting that from the counselor’s point of view, exposure might act as a barrier. In other words, preconceived ideas that children have about certain foods might impact their willingness to be exposed to tasting them. However, the teachers involved in the Food Project did not, in general, observe children opposed to being exposure to different tastes. One might infer from this that there was something about the Food Project that made children comfortable with and open to trying novel foods. As a mentor in the Food Project, I believe this to be the case. Out of the four students in my group, almost all of them were hesitant to try an unfamiliar fruit, vegetable, bread, dip, or spice. However, once one student saw another student try an unfamiliar food—regardless of that student’s reaction—the other student seemed more curious to try it. The students also responded to repeated exposure, as evident when we made the same spice mixture during two non-consecutive lessons. During the second round of spice mixture making, the students were more eager to have a role in the process and were also more willing to try the spice mixture during the grinding and mixing process in order to determine what quantities of spices were needed to optimize the mixture’s flavor. It seemed that the students of the Food Project required repeated exposure opportunities in order to transform unfamiliar foods and flavors into familiar ones. From my experiences, I can reasonable conclude that how children are exposed to foods (that is, the environmental context in which this exposure occurs) plays a role in their willingness to taste the novel or unfamiliar.

Although children are willing to experience unfamiliar tastes, the context in which they are encouraged to do so must be appropriate. Despite their innate curiosity, at the start of any new or unfamiliar journey children might still require the support of those older or more experienced than themselves. The experience of food exposure is no different. That is, children need responsible individuals to act as role models in the food exposure experience.

In fact, some of the unique components to the Food Project are the relationships formed between the 5<sup>th</sup> or 6<sup>th</sup> grade students and the Penn student mentors. This was something that both classroom teachers reported as an important component to the Food Project:

“Well [the children] enjoyed having conversation with the college students. They did...because for many of them, just to sit and have a conversation with someone about something that they don't normally talk about. They really enjoyed that” (January 30, 2013, Teacher B).

It is interesting that the classroom teachers saw the mentor-mentee relationships as valuable, as this was something that the AUNI coordinator brought up in his reflections on the initial development of the Food Project:

“We knew that we wanted to have small groups. From the beginning, the emphasis on small groups was there just as a strategy for engagement.” (April 10, 2013, AUNI Student Engagement Coordinator)

It is important, here, to bring up a few things about the mentor-mentee relationship. Like the process of establishing acceptance of novel foods and flavors, forming the mentor-mentee relationship takes time. In my experience as a mentor, I felt immense improvements in the relationships I shared with my mentees as the weeks went by and we spent more time together. Additionally, it is clear from teacher feedback, personal observation, and personal experience that the Food Project provides a platform for discussions about food and eating. Within this platform, there are ample opportunities for mentors and mentees alike to express their thoughts, questions, and opinions with each other in individualized conversation. The prevalence of these interactions is certainly an indication of the flexible, welcoming, and respectful learning environment fostered by the Food Project. As alluded to before, an environment such as this is critical in developing competent and confident eaters.

However, the strength of the relationships between Penn mentors and 5<sup>th</sup> and 6<sup>th</sup> grade mentees links back to the idea that children, although curious, need a secure base from which to be accepting of exposure to new foods and trust in the ability to transform a food or flavor from

unfamiliar, and possibly unsafe, to familiar and safe. By modeling positive eating behaviors and food acceptance skills, the Penn mentors support their younger mentees' exploration of food and eating. These relationships signal, both to mentors and mentees alike, that the Food Project environment is one where it is safe to try new foods, where it is okay to not like a food, and where everyone is respectful of their own and others food and eating decisions.

Forming relationships with mentees was perhaps one of my favorite parts as a mentor participating in the Food Project. Although I initially signed up for the class with the impression that I would be helping a nutrition teacher teach a nutrition lesson, I quickly recognized my misunderstanding. I learned the value of time spent interacting with my mentees one—on—one. Together as a mentor-mentee group, we used mortar and pestles to make a spice rub, cooked a rice and vegetable stir-fry flavored with our spice rub, sampled many different breads, spreads, and dips—including pita, naan, hummus, and fig butter—explored Philly foods, and designed snack stacks—combinations of fruits, vegetables, cheese, and various spreads sandwiched between two crackers. As the 10-week Project progressed, my mentees surprised me with their increased confidence in chopping veggies, following a recipe, grinding spices, and sampling novel foods such as “spongebread” (Ethiopian *injera* bread), seaweed, super hot spicy mustard—made by Food Project mentors and students—and curried lentil dip. Although I certainly enjoyed eating most of the different foods myself, I took great pleasure in seeing my mentees grow as choppers, cooks, critics, and eaters. In looking back on my first experience, I now appreciate the ways in which my interactions with my mentees and the activities we did together as a mentor-mentee group served to increase not only their eating competence but my own as well.

### **iii.) Exploration**

The third E is exploration. One way to explore food is certainly by tasting it. However, it is important for the food component of a school-based intervention to acknowledge that food can be explored in other valuable ways.

In talking with one of the classroom teachers, she mentioned the spice rub mixtures that each mentor-mentee group made during the Food Project. In fact, during the Food Projects in 2011 and 2012, each group made a different spice mixture that was associated with a different region. These regions included: Asia, Western Europe, Latin America, and the American Southwest. Each group made their spice mixture by pulverizing and combining a variety of

complementary spices using a mortar and pestle. Mentors and mentees then had the opportunity to explore the textures and smells of each component of the spice mixture before tasting it in an olive oil based dip with bread. After a few weeks passed, the groups made their spice mixture again, but this time used it to flavor a rice and veggie stir-fry. Mentors and mentees worked together to chop and sauté veggies, cook rice, pound and mix spices, and mix everything together to create a delicious, aromatic, and completely classroom-made dish. Finally, at the end of the Food project, mentees took home small tins with their spice mixtures to use at home when cooking with their parents and families.

From a nutritionism perspective, one might see these lessons as valuable in that they taught children that foods can be flavored in delicious ways that do not involve adding excessive quantities of sugar, salt, or fat. However, the value of the lessons extended much beyond that. Interacting with the textures, smells, sights, and tastes of the different spices in a spice mixture provided a window through which children were able to explore the cuisine of an unfamiliar geographic region. Coupling this geographic exploration with the exploration opportunities provided by chopping vegetables with sharp knives, pounding spices in a mortar using a pestle, and talking with mentors and fellow mentees throughout the entire process provided excellent and appropriate opportunities for children to gain skills as competent eaters.

While it is neat that the Food Project allows students to explore the foods and flavors of geographically distant places and spaces, the fact that the Project encourages children to explore food within the context of their own home and familial environments is just as valuable.

“One of the focuses of several lessons was, ‘How does food fit into your special occasions and your families? How do we associated food with special occasions?’ If your grandmother makes a specific recipe or a specific dish, that quite often makes you feel good.” (January 30, 2013, Teacher A)

This comment from one of the classroom teachers addresses one way that the Project attempts to bridge the gap between the home and school environments. A consistent component to many of the lessons of the Food Project involved asking students to interview a family member about their food preferences, their favorite recipe, or their memories surrounding a particular food or context. It is interesting that food plays such a large role in our lives in that it keeps us alive, but that it is not something that parents actively talk about with their children. However, food and eating differ from school subjects such as algebra, world history, or phonics in that we all don’t have to know about it or study it in order to talk about it. That is, we all eat

and we are all capable of talking about what we eat. Since bridging the gap between home and school and increasing parent involvement in their child's education is viewed as something in need of continual improvement, it seems important to explicitly point out that food and eating-related activities in schools serve as the perfect opportunity to engage parents. Throughout the Food Project, prompting children to talk about food with their parents, grandparents, aunts, uncles, cousins, or siblings through this interview format promoted at-home discussion of activities happening at school. The opportunities provided by exploration of food within different cultural, geographic, familial, and personal contexts each served to foster eating competence and confidence in the children participating in the Food Project.

#### **iv.) Experience**

The final E that is essential when promoting eating confidence and competence in children is experience. The importance of experience was previously alluded to in this paper when comparing the success of interventions targeting physical activity with those targeting physical activity and nutrition or nutrition alone. However, previous discussion was focused on the importance of providing children with experiences. These experiences can be in the form of exposure and exploration. This section of the thesis will focus on eating as an experience in and of itself.

Recognizing eating as an experience asserts the idea that eating occurs within important social contexts. As previously mentioned, nutrition education that is nutritionism-centered neglects to look at the broader context in which food is eaten and enjoyed. This could perhaps be a reason why previous nutrition interventions have not been able to consistently report successful outcomes. By neglecting to recognize and respect the context in which food is eaten, food habits cannot be effectively changed (Mead 1941).

The Food Project recognizes eating as an experience. After a group cooks, prepares, or processes something together, they have time to sit, talk, and eat together. In interviews, both of the classroom teachers saw these conversations as valuable:

“Especially talk[ing] with someone who was older, like that they were important to someone else who was a bit older. And the college students were so patient and listened to so many stories.” (January 30, 2013, Teacher B).

The effectiveness of the mentor-mentee relationships and the meaningful conversations that occurred during the Food Project were made possible by the low ratio of mentors to mentees. The ratio allowed mentors to listen to and be supportive of their younger mentees. It also provided mentees many opportunities to have an adult figure be an active listener who was interested in and receptive to what they had to say. It is noteworthy that the school counselor recognized the importance—from a social-emotional perspective—of just being there for children as an active listener:

“A lot of it is making sure that students feel that you are available to them. Some students just wander in at lunch and you can tell that they just want just somebody to pay attention to them for a little while and talk about whatever’s going on.”  
(January 30, 2013, School Counselor)

However, these conversational opportunities served the dual purpose of teaching children about the social aspects of eating. This aspect of the Food Project connects back with previous ideas about the environment in which a school-based intervention occurs. In this case, it is clear that an environment where meal-centered conversation flows freely supports the goal of providing children with a learning environment where their questions, thoughts, and opinions are welcomed and respected.

In reflecting upon my observations of the Food Project, I was struck by the connections that I can make between the eating environment created by the Food Project and that of VFFC’s Eatiquette program. After visiting an elementary school Eatiquette lunch, I noted the ways in which the program values the experience of sharing a meal. The use of table captains prevents students from waiting in a line for food. Round tables allowed the students to talk with each other throughout the course of the meal. The food was served family-style, which further promoted the idea of meal sharing. This resonates with Satter’s views on the importance of family meals. She asserts that regular family meals have positive nutritional, academic, social, and emotional benefits (Satter 2007). Like a family meal, students in the Eatiquette program physically share in the lunch foods they eat, but also share in their experience of eating lunch through conversation. Additionally, the Eatiquette program provides children with opportunities to observe and mimic the social behaviors of teachers and peers during a meal. In this way, Eatiquette supports the eating experience.

Both the Food Project and the Eatiquette program can be characterized by their flexible and familiar nature, promoting children to be active participants in the eating experience. As

Satter asserts, in order to foster eating competence children need structured opportunities to learn and personal autonomy within that structure (Satter 2007). I would argue that both the Food Project and the Eatiquette program provide children with these opportunities by acknowledging and respecting eating as an experience in and of itself. Both programs provide structure in determining the what, where, and when of eating. However, children have autonomy within that structure to determine whether they want to eat and how much they want to eat. In this way, it is clear that by supporting the eating experience, adults can help children build eating competence.

### **Conclusions**

In this paper, I have acknowledged that levels of pediatric overweight and obesity in the United States of America have reached epidemic proportions. Based on examinations of bodies of research on school-based healthy lifestyle interventions and the amount of funding that gets funneled into this research, it is very clear that attention is being directed to this alarming trend. However, it is perplexing that such a high level of attention and abundance of school-based nutrition programs co-exist with high levels of overweight and obesity. This might suggest that current nutrition education methods are ineffective. To test this thought, this paper examined past school-based interventions to find patterns in reports of successes and failures.

With this in mind, this paper used anthropological approaches to eating and food to enable a critique of school-based interventions and to look to ways in which such approaches might be altered. In the United States, both the study of nutrition and the training of nutritional professionals place great emphasis on a nutrient-based approach to healthy eating. Nutritionism—the hyper-reduction of food to its nutrient and caloric composition—discounts the idea that social, cultural, and individual experiences impact the meaning behind, feelings surrounding, and experience of eating. This paper referred to the ideas and terms promoted by nutritionism as *food noise*. Food noise greatly—and unnecessarily—complicates Americans' relationships with food as it diminishes the actual experience and enjoyment of eating food. Environments bustling with food noise make it difficult for adults, and for children, to form stable eating habits. Unfortunately, the nutrition components of many school-based interventions are very loud with food noise in their attempts to mold children into “healthy” eaters.

The thesis proposed that instead of aspiring to form children into “healthy” eaters, school-based interventions should attempt to diminish food noise and foster eating competence

and confidence in children. In order to do this, interventions must take into account four Es: Environment, Exposure, Exploration, and Experience.

The classroom environment of school-based interventions must be addressed. This need is based on the unfortunate observation that the prominence of *food noise* has spilled over from American culture into the classrooms of nutritionism-centered, school-based interventions. By placing an emphasis on the nutrient composition of foods, for example, these interventions promote the existence of food noise. Sure, a scientist might think it interesting to learn about differences in macro- and micro-nutrients in specific foods such as milk, wheat bread, or butter, but having children learn this information will not support eating behavior changes. After all, in everyday life we eat food and not nutrients. Although interventions cannot prevent food noise within American culture, they can actively minimize food noise in a more localized environment: the classroom. This can be done by creating a learning culture where children feel good about themselves, are confident in their abilities, and respect others. Such a classroom environment will promote positive behaviors and attitudes towards eating and food, a step towards eating competence. Using the skills that children learn within this classroom environment, they will become more confident in their abilities to navigate food contexts outside of the classroom.

Improving nutrition interventions requires focusing on interactive exposure. You will recall from the *Discussion of Conventional Methods* section that physical activity was the one component of current school-based interventions that was most often associated with reported success. This thesis speculated that this was because it was rare for physical activity interventions to *tell* children that they should be physically active, but not give them opportunity to actually *be* active. Emphasis on this type of exposure to kinesthetic learning is certainly missing from conventional nutrition interventions, which is perhaps suggestive of why such interventions are failing. Interactive exposure to foods through sight, touch, taste, sound, and smell allows children to experience food without the noise inherent in, for example, a lesson on nutrition labels. It is also important to point out that although children have a desire to act on their innate curiosity—useful when introducing novel foods—they are also sensitive to the nature of that exposure. The nature of exposure—both how items are presented and the way children’s responses are received—will play a role in their future willingness to taste new or unfamiliar foods. In order to be receptive to novel foods, children need to know they are in a secure environment with adults or peers who they trust and they know they can look to for guidance.



Interventions must provide children with opportunities for eating exploration. Prior to actually tasting a food, often children need to time to become more familiar with it. Some routes to increasing familiarity include learning about a food through senses other than tastes, exploring the different cultural or geographic origins of a food, or even preparing a dish as a class that incorporates new ingredients. Each of these explorational opportunities will serve to foster eating competence and confidence in children.

Finally, interventions should respect eating as an experience in and of itself. Supporting the experience of eating is important in that it allows children to step up and adults to step back. By having children and adults participate in the eating experience together, adults can provide children with a structure that determines the what, when, and where of eating and children can have autonomy is the whether and how much of eating. This balance of dependence and autonomy works to develop skills as a competent eater. As mentioned previously, one of the faults of past and current nutritionism-centered interventions is that they do not look at the broader context in which food is eaten and enjoyed. By acknowledging and respecting the eating experience itself, adults in the classroom support children in changing their own food habits.

The fours Es of environment, exposure, exploration, and experience are important in that they work together to give children opportunities to develop positive attitudes about food and eating. Only after children have developed the skills to be competent and confident eaters is it reasonable to expect them to make sustainable and stable changes in food habits.

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**Table 1. Interventions Targeting Diet/Nutrition and Physical Activity**

#	Year	Researchers	Method	Behavior to target	Outcome Measure	Length	Behavioral Theory	Successful?	Results Reported
1	2008	Foster et al.	classroom-based nutrition education + goal setting + parent involvement	dietary change	BMI	2 yr, 1x a week	social marketing	Yes	decreases in BMI/% overweight and obese
2	2003	Bansal et al.	nutrition education + physical activity	PA and dietary knowledge	pre/post survey	1 mo, 1x a week	n/a	Yes	increased duration of PA
3	2010	Dzewaltoski et al.	PA and nutrition education and doing/eating	PA	BMI/fitness	3 years, 5x a week	SCT	Yes	increases in cardiovascular fitness, no improvements in BMI percentiles
4	2001	Asbeck et al.	Focus on family, diet and PA changes being supported via education and counseling	diet and PA knowledge	BMI/body composition + pre/post survey	12 weeks, 1x a week	n/a	Yes	increases in nutrition knowledge, decrease in percent fat
5	2011	Annesi et al.	Exercise + nutrition education + behavior training	PA	BMI	12 weeks, once a week	SCT	Yes	2 found sig improvements in BMI (both of these reported improvements in cardiovascular fitness); All others just reported increases in PA
7	2007	Speroni et al.	physical activity + nutrition education	PA + changing diet	BMI	12 weeks, 1x a week	SCT	Yes	decrease in BMI compared to control group
8	2011	Carson et al.	nutrition education activities + PA	PA + changing diet	BMI; parent survey	4 mos, 1x a week	none	Yes	improvements in BMI percentile and diet (as reported by the parents)
9	2008	Slawta et al.	physical activity, nutrition education, involved parents in nutrition education	diet knowledge	BMI/body composition	12 weeks, 3x a week	Precede/Proceed model	Yes	improvement in BMI percentile, fitness; improvement in nutrition knowledge, but not changes in eating habits



**Table 1. Interventions Targeting Diet/Nutrition and Physical Activity (continued)**

#	Year	Researchers	Method	Behavior to target	Outcome Measure	Length	Behavioral Theory	Successful?	Results Reported
10	2008	Gutin et al.	eating healthy snack + over an hour for physical activity	PA and changing diet	BMI	3 school years, 5x a week for 2 hours	n/a	Yes	improvements in bone density and BMI percentile over the 3 years
11	2005	Graf et al.	nutrition education activities (cooking) + PA	PA and changing diet	pre/post survey	10 mos, 1x a week	n/a	No	no changes in diet reported
12	2009	Huberty et al.	educational and behavioral-based activities for nutrition and physical activity	diet and PA knowledge	BMI	implementation duration at different sites varied	SCT	No	didn't improve children's reported desires to do PA; decreases in BMI
13	2007	Bittle et al.	booklet on diet and PA habits	diet and PA knowledge	BMI + pre/post survey	4 yrs	n/a	No	no decreases in BMI seen; no significant knowledge demonstrated

**Table 2. Interventions Targeting Diet/Nutrition**

#	Year	Researchers	Method	Behavior to target	Outcome Measure	Length	Behavioral Theory	successful?	Results Reported
14	2007	Contento et al.	nutrition education through science (C3)	dietary change	pre/post survey	2 mos, 3x a week	theory of planned behavior	Yes	improvement in eating and physical activity habits
15	2008	Abood et al.	nutrition education presentations	diet knowledge	pre/post survey	1 week	n/a	Yes	some improvements in nutrition knowledge
16	2007	McAleese and Rankin	garden-based nutrition education program	dietary change	pre/post survey	3 mos, 1x a week	n/a	Yes	increased fruit and vegetable consumption
17	2008	Dake et al.	nutrition education presentations	diet knowledge	pre/post survey	1 mo, 2x a week	n/a	Yes	improvement in nutrition knowledge
18	2011	Davis et al.	gardening, cooking as nutrition education	changing diet	BMI	3 mos, 1x a week	none	Yes	decrease in BMI compared to control group
19	2004	Hardman et al.	nutrition education videos	diet education	pre/post survey	5 mos	behavior modeling	Yes	increases in F/V intake
20	2003	Cabellero et al.	classroom-based nutrition education	dietary change	pre/post survey	3 mos, 2x a week	SCT	Yes	knowledge and behaviors changed positively/increased
21	2006	Evans et al.	nutrition education with parents + media literacy	FV intake	survey~pre/post	6 weeks, 2x a week	SCT	Variable	improvements in reported motivation and food environment at home
22	2010	Freedman et al.	nutrition education activities	diet education	survey~pre/post	10 mos, 3x a week	SCT	Variable	only increases in water intake were significant (no changes in fruit/veggies, milk)
23	2009	Branscum et al.	training to help kids identify healthy foods	diet knowledge	survey~pre/post	6 weeks, once a week	SCT	Variable	some improvements for reported dietary behaviors
24	2011	de Heer et al.	nutrition education activities	diet education	BMI	3 mos, 2x a week	SCT	Variable	some improvements in BMI percentile

**Table 2. Interventions Targeting Diet/Nutrition (continued)**

#	Year	Researchers	Method	Behavior to target	Outcome Measure	Length	Behavioral Theory	successful?	Results Reported
25	2003	Bradshaw et al.	Nutrition Education activities (preparing snacks)	Changing diet	BMI and pre/post surveys	14 mos	n/a	Variable	Increases in nutrition knowledge and F/V intake; no changes in BMI
26	2007	Greiner et al.	nutrition education	diet knowledge	BMI	3 years, 100 lessons total	n/a	Variable	some improvements in BMI percentile
27	2004	Albala et al.	nutrition education	diet knowledge	BMI	1 yr	n/a	Variable	BMI decreases in boys, not girls
28	2008	Canavera et al.	classroom-based nutrition education	4 main goals (PA < dietary change, reduce screen time, reducing sugar sweetened beverages)	BMI + pre/post survey	3 mos, 1x a week	SCT	No	no significant results
29	2006	Beckman et al.	nutrition education and goal setting	dietary change	BMI	6 weeks, once a week	n/a	No	no changes
30	2009	Neumark-Sztainer et al.	nutrition education through theater and performing arts activities	PA and changing diet	BMI	2 mos, 2-3x a week	SCT	No	no changes in BMI, reported diet, PA etc
31	2010	Rosenkranz et al.	nutrition education activities	diet education	BMI	4 mos, 2x a month	SCT	No	no changes in BMI/dietary intake

**Table 3. Interventions Targeting Physical Activity**

#	Year	Researchers	Method	Behavior to target	Outcome Measure	Length	Behavioral Theory	successful?	Results Reported
32	2006	Jago et al.	pilates	PA	BMI	4 weeks, 5x a week	n/a	Yes	improvement in BMI percentile
33	2011	Howe et al.	physical activity intervention (learning about PA, doing PA, and stretching)	PA	BMI	10 mos, 5x a week	n/a	Yes	improvements in BMI percentile and cardiovascular fitness
34	2009	Topp et al.	PA activity with track and field games	n/a	BMI/fitness	3.5 mos, 3x a week	transtheoretical model	Variable	increases in cardiovascular fitness, no improvements in BMI percentiles
35	2010	Robinson et al.	dance program	PA	BMI + pre/post survey	2 years, 2x a week	SCT	Variable	improvements in depressive symptoms, no changes in BMI percentiles

**Table 4. Other Interventions Reviewed**

#	Year	Researchers	Method	Behavior to target	Outcome Measure	Length	Behavioral Theory	successful?	Results Reported
36	2008	Bica et al.	handing out fruits and vegetables each day	fruit and vegetable consumption	none (observation based)	1 year	n/a	Yes	increased desire to try new fruits and vegetables observed (compared to control)
37	2004	Cavan et al.	message delivered to kids about decreasing soda consumption	soda consumption	soda consumption	1 yr, 1x a week	n/a	Yes	decreases in soda consumption reported
38	2010	Matvienko et al.	snack and supervised non-structured play	PA and changing diet	BMI	4 weeks, 5x a week	none	Variable	some improvements in fitness; none in BMI
39	2001	Sahota et al.	school developed healthy school plan	PA and diet	BMI	1 yr	n/a	No	no changes in BMI